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AMERICAN MACHINIST

A JOURNAL FOR MACHINISTS, ENGINEERS, FOUNDERS, BOILER MAKERS, PATTERN MAKERS AND BLACKSMITHS.

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New Compound Air Pump and Condenser.

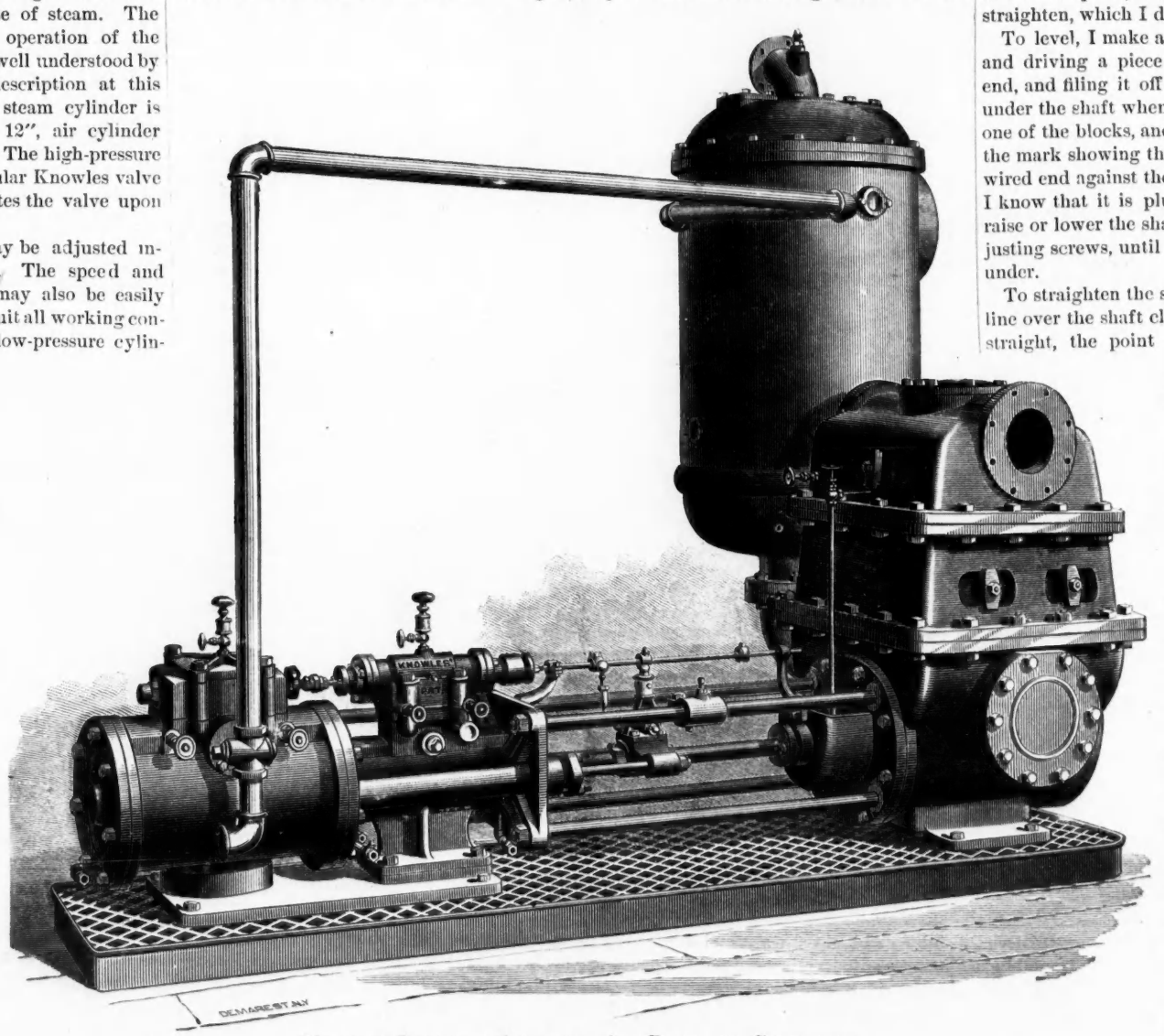
In the AMERICAN MACHINIST of December 17, 1881, there appeared illustrated descriptions of independent air pumps and condensing apparatus, which descriptions with but few exceptions, apply equally to the air pump and condenser presented herewith. The one here shown represents a compound steam cylinder, which affords greater advantages in the economical use of steam. The principles and practical operation of the compound engine are too well understood by our readers to require description at this time. The high-pressure steam cylinder is 6″ diameter, low-pressure 12″, air cylinder 16″, with a stroke of 16″. The high-pressure steam cylinder has the regular Knowles valve motion, which also operates the valve upon the low-pressure cylinder.

Each of these valves may be adjusted independently of the other. The speed and cushioning of the piston may also be easily and quickly adjusted to suit all working conditions. The high and low-pressure cylinders are separated by a solid cylinder head, connection being made from the low-pressure piston to the cross head by means of two piston rods which pass through two sleeves, with stuffing boxes at either side of the high-pressure cylinder.

By this arrangement, all danger from leaks between the two cylinders is avoided. The exhaust pipe from the cylinder is connected with the condenser, as shown. The air pump, as will be observed, is made so that the condenser may be attached to either side as may be desired. The valves are easily accessible.

A compound air pump and condenser of the size herein alluded to is now working, attached to a 300-H.P. steam engine of the Corliss type, with an economy, stated on good authority, of 1.9 per cent. of the indicated H.P. of the engine. All the steam required to drive this air pump passes through a steam pipe ¼-inch inside diameter.

This apparatus is made by the Knowles Steam Pump Works, 86 Liberty St., New York, and 44 Washington St., Boston.



KNOWLES IMPROVED COMPOUND AIR PUMP AND CONDENSER.

Compressed air locomotives are in regular and successful operation in Germany, France and England. They have been tried in this country with good results, and should be adopted, especially on elevated railroads. Their neatness and convenience commend them to every citizen who uses the public streets. Running expenses of compressed-air locomotives (except where the air is compressed by water power) may slightly exceed the cost of using steam locomotives, but companies that have the privilege of occupying the streets with railroad structures ought to be required to consult the comfort and convenience of the public along their routes, even at some additional cost.

Putting up Line Shafts—Setting Engines and Tools.

BY H. REYNOLDS.

How to put up a line shaft with the least labor, and so as to know that it is all right when done, is a question that bothers a good many machinists. In putting up line shafting, in many cases the trouble is in not making haste more slowly. For if the shaft is not put up true, of what avail is the speed with which the job is done?

I have adopted a plan that suits me well and gives good results, and I offer it for the consideration of others. If, for instance, I am to put up all the shafting, together with engine, etc., I commence by making a ground plan, showing the location of the tools to be run, and study so to place them, that the work may progress from one to another, or from the beginning to the conclusion, with as little handling as possible. Then, knowing the speed that the tools should run, I note what size pulleys are wanted on the line, and on what section they are wanted. I then take the longest shaft and lay out where I wish to place hangers, and I am then ready for business. If there are to be any extra timbers put in, I show the carpenter just where they are wanted, and proceed to locate permanent points, from which all measurements are taken, by measuring from one of the corners to whatever distance the line is to be from the side of the room, and driving a copper or brass nail and marking with prick punch, to show the exact center—and the same at the opposite end of the room. Then from one point to the other snap a fine chalk line, being careful to have it thumbed at frequent intervals, if the line is long, so that it may show only one mark. I then drop a plumb line from the ceiling to the center marks on the witness nails, and snap a line across the timbers, taking the same care as on the floor. I then have as many wooden blocks—3 or 4 inches longer than the box, 3 or 4 inches wide, and 1 inch thick—as there are hangers, and tack them on the floor, over the chalk line, and under where the hangers are to be located, and level them very carefully, taking pains to change ends with the level and staff, so as to neutralize any error there may be in the staff or level. I then cut a measure to go from one of the blocks to timber above, on which the feet of the hanger rests, and from each of the blocks lay off, on these timbers, how much is to be taken off or added to, to make all of the seats for hangers level. Then from the chalk line already made, measure either way and mark for the bolt holes.

Now, while the carpenter is doing his work, I measure on each block, from center mark for hangers, half the length of the box either way, and make a mark across the block, and on that mark I lay off half the diameter of the shaft and make a cross mark or dot, to line the shaft by.

Everything is now ready to bolt up the hangers, put the pulleys on the shaft, as required by the ground plan, and hoist the shaft into place, and proceed to level and straighten, which I do as follows:

To level, I make a tram, by taking a pole and driving a piece of wire or a nail in the end, and filing it off until it will just pass under the shaft when the end is resting on one of the blocks, and by placing one end on the mark showing the length of box and the wired end against the shaft close by the box, I know that it is plumb, and have only to raise or lower the shaft by means of the adjusting screws, until the pole will just pass under.

To straighten the shaft, I drop the plumb line over the shaft close to the hanger, and if straight, the point of the plumb will be just at the mark laid off on the block, as described before, this being done at each of the hangers, and the job, so far as the line shaft is concerned, is completed.

Now, to locate the counter shaft, I measure from the witness nails driven in the floor, as far as it is to be from the main shaft, and snap a line as before described, and proceed in every way as on the main line. If desirable to set the tools as the work goes along, I do it all by the floor lines. For instance, to set a lathe, move the tail center to the farther end of the ways, and drop a line from the center to the floor, then move the lathe until the plumb point is the same distance from the floor line at both centers. For an iron planer, lay a straight edge across the bed and against the uprights, and drop lines from that, and so on with all of the tools.

To set the engine, go back to the witness nails, and measure distance to the center of engine shaft; or, if not convenient to measure from the nails, measure from any convenient point on the floor line between those nails, and locate the ground line, from which to lay out engine foundation in the usual way.

If there is to be shafting on the floor above, bore a small hole as near over the witness nails as possible, through which drop a plumb, and measure from the point to the nail, and then from the line above the floor measure off the same distance and drive witness nails for that floor, and so on from floor to floor, repeating the operation as described on the first floor.

Experts may criticise my way of doing the job, but they are not the ones I am talking to, but to the men who have never had occasion to put up a line shaft. The problem is, how to put up a line shaft with the least labor, and know that it is all right when done.

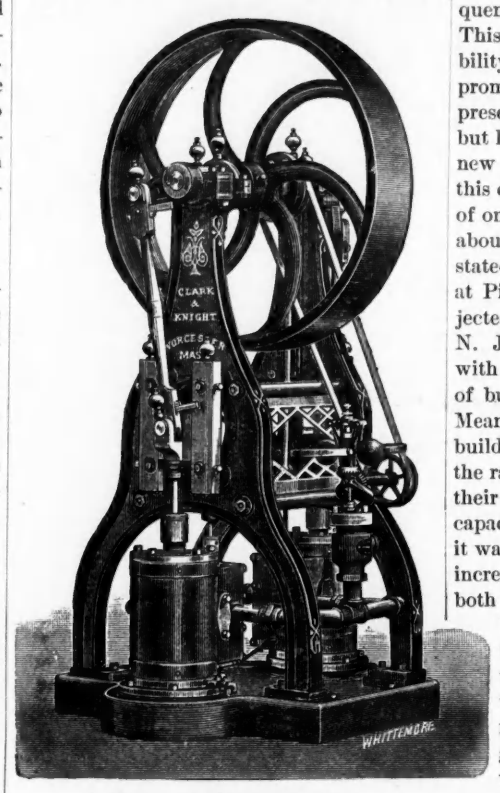
Two-Cylinder Vertical Steam Engine.

The demand for steam engines of moderately small power has for the past three or four years been somewhat phenomenal, and as might be expected has resulted in bringing out many claimants for popular favor. While the judgment or the prejudices of the individual purchaser generally leads him to purchase in accordance therewith, it is nevertheless frequently the case that the room that can be spared for the locating of the engine has considerable to do with the selection of the peculiar type.

The engraving herewith presented represents a steam engine that is claimed to possess features recommending it to favorable considerations, and which is made in small sizes. As will be seen, it has two cylinders, which are bolted to the bed plate, and the shaft is at the top of the stands, thus bringing the driving pulley overhead, and in such a location as to admit of belting to the line shaft without taking up floor room in the passage of the belt. The stands or housings are arched at the bottom, so as to make all parts of the cylinder easy of access, and also to brace against the pull of the belt in transmitting the power.

The parts are well finished and made largely of steel, and altogether, the engine presents a neat and serviceable appearance.

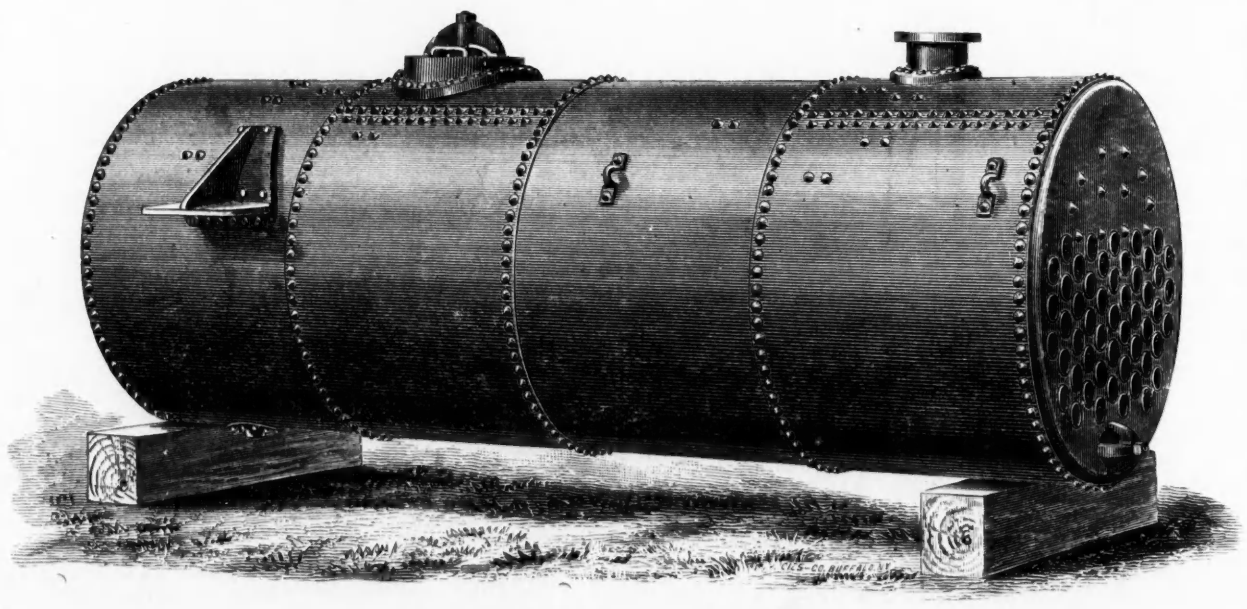
These engines are made by Clark & Knight, Worcester, Mass.



A TYPE OF VERTICAL ENGINE.

Horizontal Tubular Boilers.

We present herewith an engraving of a horizontal tubular steam boiler, as built by Woodbury, Booth & Pryor, Rochester, N. Y., and recommended by them to be used with their automatic cut-off engine. While there is little absolutely new in this boiler, we publish it in part for the purpose of calling attention to what is, after all, entitled to be considered the representative stationary steam boiler in this country, and in part to call attention to some of the distinctive features adopted by the parties above mentioned, and some of the arguments used in their favor.



A STANDARD HORIZONTAL TUBULAR BOILER.

It will be seen that this boiler as constructed is not provided with a dome, in which it differs from the majority of boilers of this class, although many of the most observing engineers have of late years come to doubt their value, while the fact that they materially weaken the shell has been indisputably demonstrated.

As an argument against the utility of the dome, it is said that a dome, as ordinarily constructed, would contain steam enough to supply an engine from $\frac{1}{20}$ to $\frac{1}{10}$ of a minute only, and that the steam would not be of so good quality as if taken from a point nearer the great repository of heat—the water; hence the manufacturers of this boiler construct them without domes unless especially ordered.

The perforated dry pipe, through which steam is supplied to the engine, is made of a size several times larger than the steam pipe, and is provided at its end with a hinged valve opening inwardly to provide against the possibility of the perforations becoming stopped up.

We note from a copy of printed specifications that the sheets are to be long enough in all cases to reach entirely around the boiler, and that the quality is to be "Charcoal flange fire-box iron," and "Charcoal flange iron;" also that the plates are to be planed or beveled by machines, and rivet holes are to be punched with a spacing machine; the object of planing or beveling the sheets before they are put together being, of course, to prevent the damage to the sheet underneath, resulting from scoring with the chisel when chipping after the sheets are riveted together. For reasons similar to this the concave system of riveting is used.

The accurate spacing of rivet holes by the machine insures the holes coming together fairly and does away with the injurious practice of straining the sheets by the application of drifts.

Another point which we notice is that the tubes are so arranged as to be in rows 1″ x 1¼″ distance apart and well clear of the shell of the boiler; points that have frequently been overlooked in the construction of this class of boilers, and which have sometimes tended to bring them into disrepute.

Altogether, the builders have shown an intention to popularize this simple form of boiler by attending to the detail of its construction, holding in their manufacture to the distinctive features, but changing the detail for burning tan bark, saw dust, and in fact any kind of fuel in use for generating steam.

Locomotive Building.

The manufacture of locomotives is now in an extremely flourishing condition. All the works in the country are overcrowded with orders and are able to make their own terms. Prices are nearly one hundred per cent. higher than they were three or four years ago, the ordinary eight-wheeled passenger engine which then sold for about $7,000, now bringing about $13,500. Now the manufacturer gets cash on delivery, while in 1872 and 1873 he was glad often to take the bonds of the railway companies, which frequently proved an unprofitable investment. This extraordinary prosperity and the inability of the present works to fill orders promptly, has naturally not only induced the present companies to increase their capacity, but has stimulated the organization of several new establishments. The largest works in this country, which formerly had a capacity of one engine a day, are now able to turn out about two a day, and the company, it is stated, has purchased a site for new works at Pittsburgh. New works have been projected at Rome, N. Y., and at Bordentown, N. J., and a company has been organized with a capital of $1,000,000, for the purpose of building extensive works near Chicago. Meantime, nearly all the other locomotive building establishments, including those of the railway companies, have greatly enlarged their facilities, so that the total productive capacity is nearly fifty per cent. greater than it was even a year ago. At present all this increase of facilities seems amply warranted, both by the demand for the locomotives and by the profits of manufacture, but it is the opinion of some conservative men that the increase is now being pushed too fast. After the commencement of new works it requires a long time to get them in operation, as the shops which make the machinery are also overcrowded, and some of the special machines have to be ordered at least a year ahead. In several cases recently established locomotive builders, needing additional machinery, have been compelled to place orders abroad to secure delivery in reasonable time, though these foreign tools are not best adapted to American locomotive building. We know of one company which has just received a large slotting machine which it ordered in 1879.

The investors of money in the construction of new works must therefore necessarily wait for some time for returns, and it is not impossible that the present active demand for locomotives may have begun to diminish before works now being started can be put in operation, so as to compete successfully with old-established and well-organized concerns. —*The Railway Age.*

Manufacturing Resources of North Carolina.

Editor American Machinist:

Everywhere in the South they are eager for Northern capital and Yankee thrift to help develop their resources.

Without discussing the question of manufacturing in the South, I believe that this portion of the country needs, and offers more inducements to, young men with a small amount of ready money than to any other class of people.

Land and the necessaries of life are cheap, especially to those who have cash in hand.

The government of the community in matters of public schools and protection of property is good.

Even in the mountain district I found among a primitive people living in log cabins, almost absolutely independent of supplies furnished by the outside world, that the public school house nestled among the hills; and I saw the children going to school, and understood that all the younger generation learn the rudiments of education.

With the possible exception of tobacco, every Southern crop presents opportunities for the mechanic to exercise his ingenuity in devising improvements of implements for cultivation, harvesting, and preparation for the market.

The South is poor; according to the last valuation, the average property per capita is $155.29; while in the New England States it amounts to $661.27. The distribution of wealth per square mile of territory in the Southern States is $2,849.27; in New England, $38,985.15. By reason of the mild climate and great agricultural resources, there seems to be no suffering for lack of the necessaries of life, and the abject squalid poverty of northern cities is wholly unknown here.

Far more than foreign capital, this portion of the country needs habits of frugality and business methods in life. The great majority of the farmers are in debt, and thus members of the *lower millstone order of I O U.*

They disregard the eloquent advice of their Senator, John Randolph, who said: "The philosopher's stone is to pay as you go," while their constant practice, notwithstanding all theory to the contrary, is in violation of Commodore Vanderbilt's maxim: "Never sell what you haven't got."

When the crop is planted, some storekeeper agrees to advance the farmer a certain amount in goods, taking, as security, a mortgage on the crop, the farm and the implements, and in some instances a claim on the labor of the farmer, of his wife and minor children.

This latter clause makes what is termed "a soul and body mortgage." The farmer eats up his crop before it is raised. His nose is upon the grindstone, and the storekeeper makes him turn the crank.

In some instances, of which the details were given to me, adding the difference between cash and credit prices at the store, to the sum charged for interest, made the total interest range from sixty to one hundred per cent.

A storekeeper, in conversing upon this method of transaction, admitted that it was to his interest to keep the farmers in debt to him.

Even among the large planters of the Mississippi Valley, 20 per cent. is said to be the rate for loans on crops.

The South needs the philosophy of common living, as given in the maxims of Benjamin Franklin. While desiring Northern energy, some localities are unwilling to grant independence of thought and action, which is the foundation of individual success.

Those who migrate to this beautiful country, to make a home among its boundless resources, will avoid those sections where manly liberty of opinion is merely tolerated, but not encouraged.

Open violence is not attempted against any new comer who is "offensive," but a social ostracism is the weapon generally used. Such matters are of little moment to the capitalist investing in factories and mines, a few hundred thousand dollars is a defense in

itself; but the result is different to persons of small means, dependent upon the protection of public sentiment for well being.

Nature has been bountiful to North Carolina, affording a salubrity of climate, fertility of soil and mineral wealth which yield a variety of agricultural products, timber and metals, able to supply every want of civilization.

Prof. W. C. Kerr, the State Geologist, has supplied me with records of the climate, from which I learn that the climate varies from the sub-tropical to the cold temperate; the general temperature corresponds to that of southern France and northern Italy. That of Smithville, in the southeast, coincides with Mobile and Sicily; Beaufort, on the east, with Genoa; Raleigh, in the middle section of the State, with Florence; here, at Ashville, in the mountains, 2,300 feet above the sea, the temperature is similar to Venice and Bordeaux; and in the plateaus around Grandfather Mountain, in the western portion, the climate has the average temperature of Ontario.

There is a variety of soils, and the agricultural productions of this State comprise every staple crop of the United States, except the lemon and the orange. Prof. C. D. Smith informed me that there has been found, within a radius of 150 miles from Mount Mitchell (6,582 feet), the representative of every family of plants, which are native, between the Mississippi and the Atlantic, from the Gulf of Mexico and the St. Lawrence to the great lakes, excluding certain products of Florida and aquatic plants.

Within this circle around Mount Mitchell there have been found representatives of all the animals native to the region bounded as above. At the Cotton Exposition, North Carolina exhibits 112 samples of woods. This does not include all the varieties which grow in the State, but includes every wood used for building houses and ships in the United States.

The growth of cotton has been extended 40 to 50 miles north of what was considered its extreme limit of fifteen years ago, and westward upon the slopes of the mountains. This has been accomplished by the judicious use of fertilizers adapted to the needs of the plant, and a careful selection of seed has advanced the time of ripening two to three weeks. A similar extension of the tobacco crop has taken place; and, in place of the dark shipping tobaccos, they raise a new variety with small fibers, the leaf of which can be cured to a bright golden tint, and brings two to three times as much per pound.

The whole of the State is adapted to grape culture and wine making. The Catawba grape originated in the western part of the State. The Scuppernong grape is the one most widely known for wine making.

Silk culture is well established, on a small scale, in eight counties. The mulberry tree grows without cultivation, and some have found the wild osage orange equally well fitted for silk worms.

These two products make this State peculiarly adapted to the needs of French and Italian emigrants.

In the mountain district the valleys trend to the southwest, and the humid trade winds from the Gulf of Mexico pass over the low counties, and deflected upwards by the mountains, their moisture is condensed, giving frequent light showers, which induce a prolific growth of rich herbage. I did not see gullies or similar evidences of severe rains among the mountains.

A gentleman connected with the dairy interest in central New York, stated that he considered western North Carolina the ideal country for raising cattle for beef, and also making cheese, butter and condensed milk.

In mineralogy, 178 varieties have been found, comprising every mineral used in the arts, except tin.

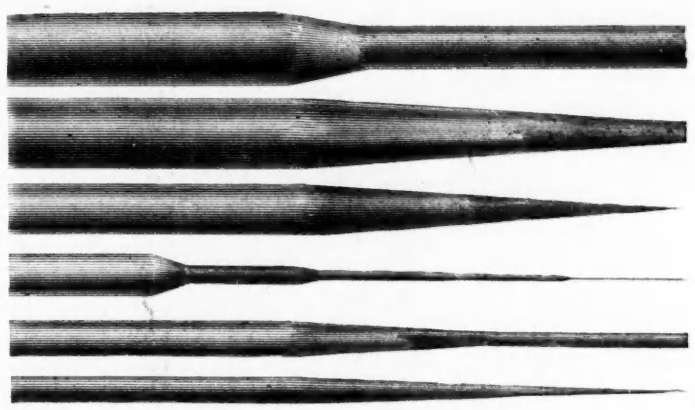
The iron mines have been more thoroughly mined than any other metal, the ores being sent to Pennsylvania furnaces.

Gold is washed out in many places. Notwithstanding the careful study of these mineral resources by professional gentlemen, who have devoted themselves to these mountains, it is probable that the full development of these mines, by ample capital, will show rich deposits, which give no indication at present.

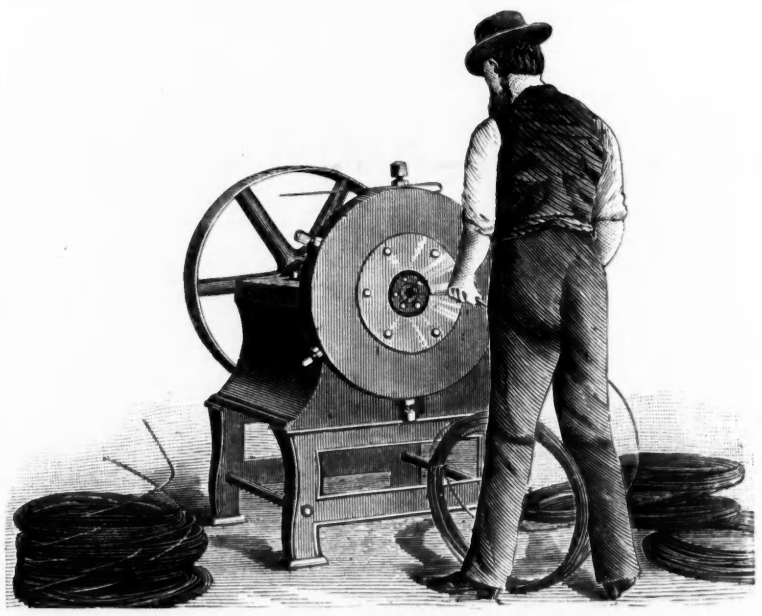
These mountains, except the higher ones, are wooded to the summit. The other day I picked green leaves of hickory, chestnut, locust, and some other leaves of bushes and trees, whose names I do not know, on the summit of Rich Mountain, about 4,000 feet from the sea.

It is this mountain country, blessed with every physical resource, that invites the settler from the North and from England. I met two gentlemen here, one of whom, from New Brunswick, owns 45,000 acres, and the other, from England, has purchased tracts amounting to 20,000, and bitterly regretted that the lack of a valid title prevented the purchase of a larger quantity.

These lands were bought for their timber and settlement by English farmers, and it will result in the acquisition, by North Carolina, of a class of emigrants fully superior to any who have yet come to America.



SAMPLES OF STEEL RODS DRAWN COLD.



MACHINE FOR DRAWING STEEL RODS.

The uniform slope of the State, from the mountain to the eastern district, affords an abundance of water power, which is well located, and sufficient to furnish all the power that will ever be required. There are numerous varieties of manufacturing carried on, but the tobacco interest is the only one conducted on a really large scale. There are 75 cotton mills in the State, with a total of 150,000 spindles.

The writer is under many obligations to southern gentlemen for their universal courtesy, and regrets that the limits of this article do not permit an allusion to many matters of interest to those who intend to migrate to this State.

Ashville, N. C. C. J. H. WOODBURY.

Brooklyn Bridge Progress.

To citizens of New York and Brooklyn the East River Bridge, so many years in process of building, has become too familiar to excite much interest, except when the trustees hold a meeting and ask for another appropriation to complete the work. Recently, the ex-Comptroller of Brooklyn delivered a lecture, in which he severely criticised the action of the trustees. In the lecture he said:

"I only protest against all further guesswork as to the probable final cost of this bridge, especially since the fluctuations in these guesses are in direct ratio to the fluctuations in the different schemes which are being hatched out in secret conclaves, and by which the engineer is constantly compelled to provide for unforseen alterations. In 1880 the people and the Legislature were most solemnly assured that, if the board could get a further appropriation of $2,250,000, that this would be final, and that the bridge would be completed by July 4, 1881. In 1881 it turned out that another $500,000 was wanted, just to put on the finishing touches, and that the bridge would surely be open for traffic on the 4th of July, 1882. And now it turns out that about $2,500,000 still are wanted, without saying anything further about 4th of July celebrations. How long! O Lord! how long!"

The bridge has already cost several million dollars more than the original estimate; and, while the work is progressing with snail-like rapidity, the demands for more money are growing apace. The floor beams have at length been laid the whole distance from tower to tower. Just what is to be done next does not appear. As the great structure slowly approaches completion, the trustees are debating among themselves whether to allow freight trains to cross, a strong opposition to such permission having arisen.

Wire Pointing Machine.

We illustrate on this page a machine for pointing or reducing wire by cold compression, or swaging. In the manufacture of many small articles, similar to samples of work illustrated, this machine is valuable for these several reasons:

No stock is removed and lost: The operation is more rapid than the ordinary methods of turning, milling, grinding, etc.: Uniformity in size and shape are insured: The operation of reducing, tapering or pointing, being performed by a succession of compressions between dies, which press the material from all points in the circumference toward the center, it follows, that articles so reduced, are equally condensed in all their parts.

To the wire manufacturer, for pointing wire rods and wire for drawing, this machinery would seem to be particularly valuable, as it is said, by the use of one machine, more wire may be pointed in a given time, cold, than it would be possible for five men to point in the ordinary way of forging hot, besides furnishing a point more nearly round, and, consequently, representing the full strength which can be passed through the die and lessening the liability to break in starting.

Another great advantage which these points have over those produced by forging, consists in the fact that they are smooth and bright, thereby making a great saving in drawing.

These machines are manufactured by S. W. Goodyear, Waterbury, Conn., who has secured all necessary rights from the owners.

The Siemens' Regenerative Gas Burner.

One of the results of the introduction of electric lighting has been to stimulate invention in the direction of improved gas illumination and, as a consequence, several practical improvements have been introduced in gas burners, as have been recorded by us from time to time. The latest advance in this direction which has been brought under our notice is that made by Mr. F. Siemens, of Dresden, and Dr. C. W. Siemens, of London, who some time since entered upon a long series of experiments with gas as an illuminant. The result has been the development of a perfectly new method of burning gas for illuminating purposes; which is now known as the regenerative system. The distinguishing characteristics of the new burner are increased illumination, with a corresponding economy in the consumption of gas, perfect ventilation, and complete combustion. The products of combustion are continuously returned by a downward current to the interior of the burner itself, and there utilized to heat a fresh supply of gas and air prior to their use at the orifice of the burner. We recently examined some of the regenerative burners at the offices of the Siemens Gaslight Company, No. 40 Queen Victoria Street, London, where they were giving excellent results.

The burner consists mainly of three concentric metallic chambers, into one of which —the intermediate one—the gas is delivered from the supply pipe, passing through a series of very small vertical tubes, at the tops of which it is ignited and burned. At this point the gas mingles with a current of air which has been heated by passing through the chamber surrounding the gas chamber, which is also heated. Within the ring of gas jets is a tube which opens downward into the third or central chamber. After rising for a short distance, the luminous band of flame, produced by the gas and heated air, curves over the top edge of this inner tube, and is sucked down into the inner chamber, which it heats. The products of combustion pass away through an exit tube, heating on their way the chambers through which the gas and air are passing to the commingling point. The intimate mixture of the gas and air is ensured by means of deflectors. The success of the system has led to its adoption in Germany, France and other countries; while in England, Mr. T. W. Keates, the consulting chemist to the Metropolitan Board of Works, after careful investigation, reported that the results are better than any he has known to be obtained with any gas burner hitherto invented. These burners will be used in illuminating the conservatory of the Horticultural Society at South Kensington, in connection with the Smoke Abatement Exhibition.—*London Times.*

The new gas holder for the Schenectady Gas Light Company is gradually approaching completion. It will have a capacity of at least 76,000 feet. The price of gas will, no doubt, be raised to meet the expense of the improvement, and that it may not interfere with the twenty per cent. semi-annual dividends of the company.—*Syracuse Evening Herald.*

Ovens for Drying Small Cores.

BY THOMAS D. WEST.

It is very important to have in a foundry an oven that will dry cores at short notice, and without burning them. I have seen a large variety of core ovens, and very few of them were good for anything, as they would burn the cores, or require a long time to dry them.

There are shops that have nothing but large ovens for drying small cores, which is all well enough as long as they have cores to fill the oven with; but to fire up a large oven to dry a few small cores, which is often done, is a very expensive and a slow process.

In building ovens, the builder or designer sometimes seems to have thought all that was required was a fireplace and a space to pile cores in; whereas, with a little more thought, they might have had an oven that would have been a success, and have cost no more than the apology for one.

The revolving oven, shown in sectional elevation (first illustration), is round, with an upright cast iron shaft, having five flanges on which to bolt plates or arms *X X*, the shape of which is shown at *B*. This oven is built with an 8″ brick wall to form the outside, and a cast iron plate for the top, on which is a box *D*, to which a cap can be bolted to hold the top of the shaft, the bottom of which rests in a cast iron seat.

The fireplace should be built outside of the circle, as shown, so that the cores will not get the direct heat from the fire. In building the walls, hinges *H H* should be built in for hanging the oven door to. This door should be made in two pieces, so as to open to the right and left, and should be the full height of oven to provide for putting cores on the top shelves. The chimney should have a top flue, as well as a bottom one, as shown at *P P*, and dampers in both, so as to throw the heat down or up, as required. When starting a fire both dampers should be open, and when the cores to be dried are on the top shelf the bottom damper may be closed, and *vice versa*.

This style of oven is very handy for drying cores that can be lifted by hand, and will hold and dry more cores with less fuel than any oven I know of. Should you want to dry a single core quick, put it on the top shelf and turn it around to the fire. This oven can be filled with cores, and they can be taken out again without going farther than the door, which alone is of great value to a core maker. The size of this oven was about 8 feet in diameter, and 7 feet high.

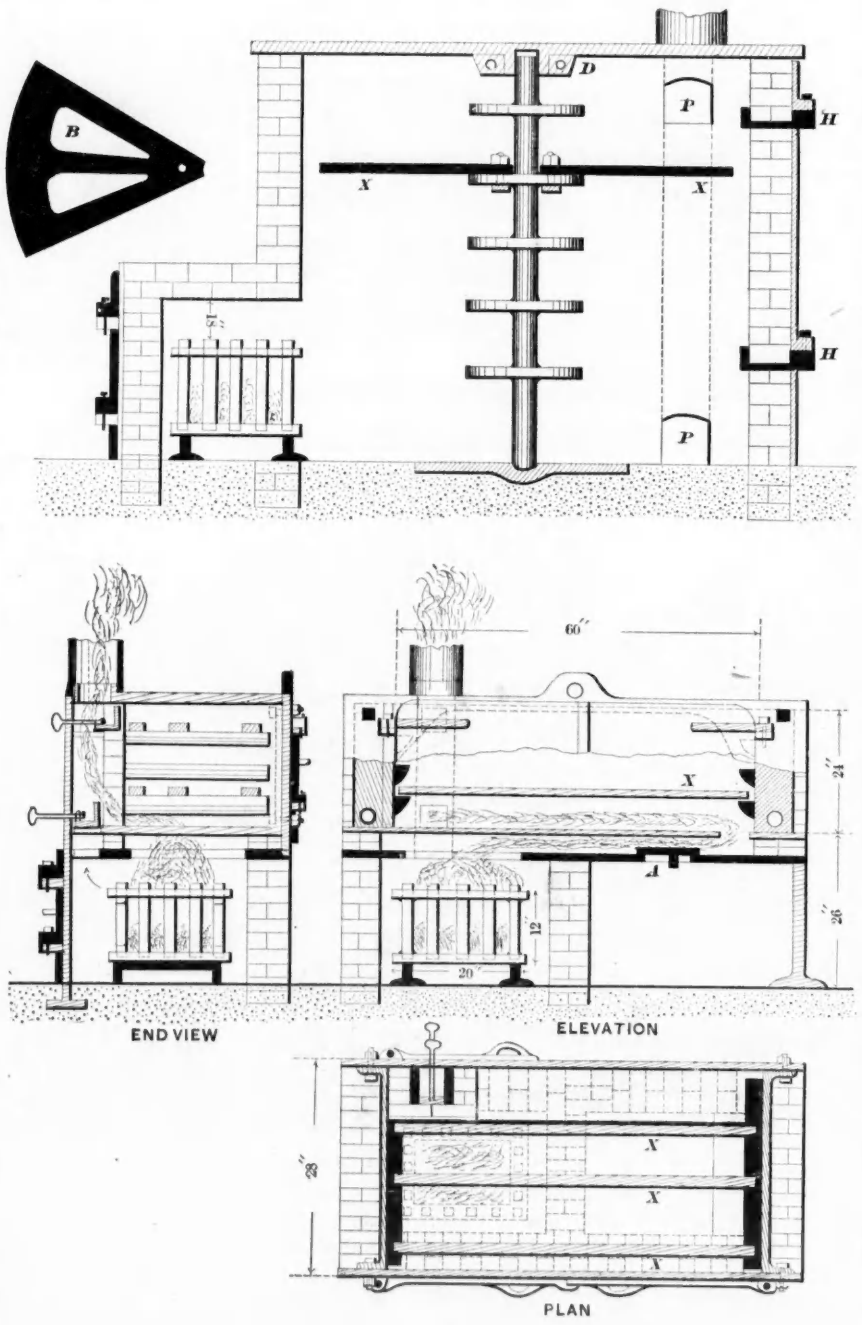
The second cut is a plan of an oven I made last winter, and for a small one I think it will be hard to beat. It will dry cores on the bottom as well as at the top, and in a very short time and without burning them. The amount of fuel used is small. It is made with two doors to open right and left, so that cores can be put in and taken out handily. The loose bars *X* can be taken out or moved, so as to make room for large cores. The opening to the fire is at the back, so as to keep all dirt and ashes out of the core-room, and the heat is drawn under to the other end of the oven, and escapes at the bottom flue, the top flue, or damper, being only opened when the fire is started, so as to let the smoke out and keep the oven clean from soot.

When starting a fire, the bottom damper being closed gives a direct draft, as shown by the arrow. The top damper is made so as to close up the front, but when pulled back it only partly closes up the chimney. The bottom damper is made so as to close up the direct draft when the heat is wanted to go into the oven, as shown.

This oven consists mostly of cast-iron plates, brick being used only for the fireplace, between the two bottom plates, for the ends of the oven and for the chimney, which is at one corner of the oven. The bottom plate, or the one over the fire, should be made about one inch thick to stand the heat.

The hole and cover shown at *A* is used for taking out the soot, or what dirt may gather between the two plates. For firing, coke is used, which makes a good, clean and cheap fire, and does not make the surface of the cores oily, as slack or soft coal does.

It is hard to blacken cores dried with soft coal, costing time of the core-maker, and often causing rough spots or holes in the castings.



The Pullman Palace Car Shops.

The Western Manufacturer for November has a supplement presenting a finely-engraved bird's eye view of the town of Pullman (Ill.), and the car works, belonging to Pullman's Palace Car Company. The engraving is over three feet long. Another engraving of the water tower and machine shops is given. Accompanying these views is a long and interesting description of the town and the different shops belonging to the company. Altogether, the publication is a commendable piece of newspaper enterprise. The town was laid out near Chicago on May 25th, 1880, 3,500 acres of land having been purchased by the Pullman Land Association. Of this tract 500 acres are devoted to the Pullman Palace Car Co.'s shops. The rapid building of this town is portrayed by our contemporary as follows:

"The work of erecting the gigantic shops, literally covering acres of ground, hotel, dwellings, etc., the construction of avenues, streets and walks, and the grading of the grounds, seem to have gone on simultaneously. It is almost impossible to convey to the mind, by words, the vast amount of work accomplished in the short time that has elapsed since the eventful 25th of May, 1880. There were no magicians' wands, no "Aladdin's Lamps," by which those palaces of industry, and homes of the industrious, were called into existence, it was all real, honest, hard work of human hands, aided by the best machinery devised by human skill and ingenuity, and directed by human intelligence and energy. And yet we doubt if the most vivid imagination of the novelist ever ventured to ascribe to the power of Oriental magic a work of such magnitude and comprehensive proportions. Compare the beautiful city of brick (for we doubt if there is a frame shanty, or a 'lean-to' even, in the town), shown in our large engraving, with the flat, unimproved prairie that lay there one short year and a half ago (nearly five months of which time were comprised in the coldest and most inclement winter weather ever experienced in this latitude), and some idea of the vast amount of work done and the energy required in its performance may be obtained."

Fourteen miles of railroad track have been laid inside the town to accommodate the works in handling cars, materials, etc.

The shops are of nearly uniform style of architecture—the round arched Gothic. The ornamentation, while not lavish, is sufficient to afford a pleasing effect to the whole. The grounds are laid out tastefully by a "landscape engineer," The Front erecting Shops and Office building is 700 x 86 feet. A tower 140 feet high surmounts the center, with smaller towers on either extremity.

"On either side of the offices are erecting shops, each 300 x 86 feet, and containing altogether 24 stalls, supplied with tracks, and massive folding doors in the rear, for running cars in and out. In the center of this building, running under the office building, is an arched carriage way, leading into the court between this and the second building.

"A word in reference to this court will be in place here. It is somewhat broader inside the floored walks or platforms attached to the buildings on either side than the length of the longest palace car, and is supplied with three sets of tracks running its entir length. In the center is a track of the ordinary standard width, while on each side is a much broader track, the three together accommodating a Transfer Table, upon which cars are run to be transferred from one shop to the other, or from one stall to another in the course of erecting and finishing. A neatly-finished dummy engine occupies the middle track, and operates the six pairs of wheels of the transfer table, which are on a long axle or shaft, by means of cogged gearing. Formerly the cars were run out of the stalls upon the transfer table by hand, requiring thirty to forty hands to push them. This work is now performed by steam power by very simple mechanism inside the dummy, invented by Mr. Robinson, the master machinist. The transfer table is placed in position, a grappling rope attached to the car to be moved, and the engine of the dummy furnishes the power to place the car on the table, or to remove it to the desired stall. This little contrivance is a great labor saver, as it performs the work of some thirty or forty hands who had been employed almost exclusively for this purpose. And, by the way, we may say here that General Utility is the commanding officer at Pullman. Every thing is utilized and made the most of.

"The second building, in the rear of that above described, is the largest in the group, and embraces the Rear Erecting Shops, 400 x 86 feet; Equipment and Paint Shops, 100 x 86 feet; Wood Machine Shop, 200 x 200 feet; and the engine room and boiler house, 200 x 86 feet; the entire frontage being 900 feet. The Rear Erecting Shops occupy 400 feet at the south end of the building. Adjoining is the Equipment and Paint Shop, in which all the upholstering, painting and all other work pertaining to the inside finishing of cars is done. Then comes the Wood Machine Shop, three stories high, in which all the woodwork of the cars is prepared ready for erection. The several stories are filled with a vast amount of wood-working machinery of the latest and most-improved kind.

"The Engine Room and Boiler House occupy the north end of the building. The engine room proper, in which is housed the famous Centennial Corliss engine, is 80 feet square and 60 feet high, with iron-truss roof and elaborately finished inside, and lighted by immense plate-glass windows, looking out across the neatly-kept lawn, with its shrubbery and flowers, to the railroad beyond. This is the mammoth Corliss engine, which became famous the world over by doing service in the Centennial Exhibition at Philadelphia in 1876. Though the tale has oft been told, it will not be out of place in this connection, to state that this engine is thirty feet high, has two cylinders 120 inches long and 40 inches in diameter, in which the large piston rods work with ten-foot stroke, and turn, at a speed of thirty-six revolutions to the minute, an immense fly-wheel, thirty feet in diameter and of fifty-six tons weight which gears into and propels a smaller ten-foot wheel; the latter turning the large underground shafts which convey the motive power to the machinery in the various buildings of the Pullman Works, and also to the Allen Paper Car-wheel Works, contigious on the north. The engine is rated at 1,400 horse power.

"The Boiler House, under the same roof with the Engine Room, occupies a space 115 x 50 feet, and is 22 feet high. It contains a battery of twelve large boilers, each 12 feet long by 6 feet diameter, in massive settings of masonry. Two additional stories above the boiler room are used for manufacturing purposes. From this point rises the great chimney or smokestack of brick, hexagonal in shape, to a height of nearly 200 feet. It is said to be one of the largest structures of the kind in the West, and forms a prominent object in the landscape.

"North of the second building above described, and on a line with it, from which it is separated by a broad court or avenue, is the Iron Machine Shop, 103 x 200 feet, three stories high, in which is performed all kinds of work in iron and brass, nickel and silver plating, glass embossing, etc. Adjoining,

on the north, is the Blacksmith shop, 126 x 200 feet, in which are 100 forges, and three large sized Sturtevant blowers. This building forms the northern limit of the frontage of the Pullman Works."

One of the most conspicuous objects in the town is the Water Tower, 70 x 70 feet, and 200 feet high. It supports a huge tank of water to be used in case of fire. This tank is of boiler iron, 56 feet diameter and 30 feet deep, with a capacity of half a million gallons. "It is supported upon a succession of wrought-iron columns of peculiar dimensions, from floor to floor, until that upon which it immediately rests, which is a net-work of strong iron trusses, capable of supporting a weight of 4,000,000 pounds. In these supports there are not less than 350 tons of wrought iron."

"In the rear of the Blacksmith shop, to the north of the Water Tower, is the Hammer Shop, 160 x 250 feet in size, a one-story, hip-roofed building, covered with slate, supported by very substantial iron truss work. From the nature of the work to be performed, this building is frame, sheathed with corrugated iron. It will contain, when complete, six hammers, of from 500 to 1,500 lbs. stroke, in addition to six large helve hammers for making car axles, etc."

"The Freight Shops, 500 x 86 feet in size, are located directly in the rear of the Rear Erecting Shop. These shops are devoted to the building of freight cars. The Dry Kiln, 150 x 90 feet, is located in the rear of the Freight Shops. This comprises eight apartments, each supplied with the most approved lumber-drying machinery, capable of turning out 64,000 feet of inch pine lumber per day."

"To the north of the Blacksmith Shops, and on a line with the second tier of buildings already described, are the Allen Paper Car Wheel Works, 370 x 150 feet, fronting on the lawn."

On one side of the works is a grand boulevard 50 feet wide, bordered with evergreens, trees and shrubs. Provision is also made in the town for a large play ground, athletic course, and gymnasium.

Improved Geared Power Press.

The accompanying engraving represents a geared power press, especially designed with reference to its adaptation to a great range of work, for which several machines would ordinarily be required. It has a stroke of 5"—the length of stroke being a prominent feature—which provides for a correspondingly increased space between the bottom of the mandrel and the bed. This feature permits the use of deep dies, and, as may be readily seen, adapts the machine to work that could not be done with a machine of short stroke; while at the same time any work that can be done on a short-stroke machine, may be done with this one. The long stroke also adapts it to be used for drawing short tubes, and for all other purposes where a reasonably extended, slow, steady motion and considerable power are required.

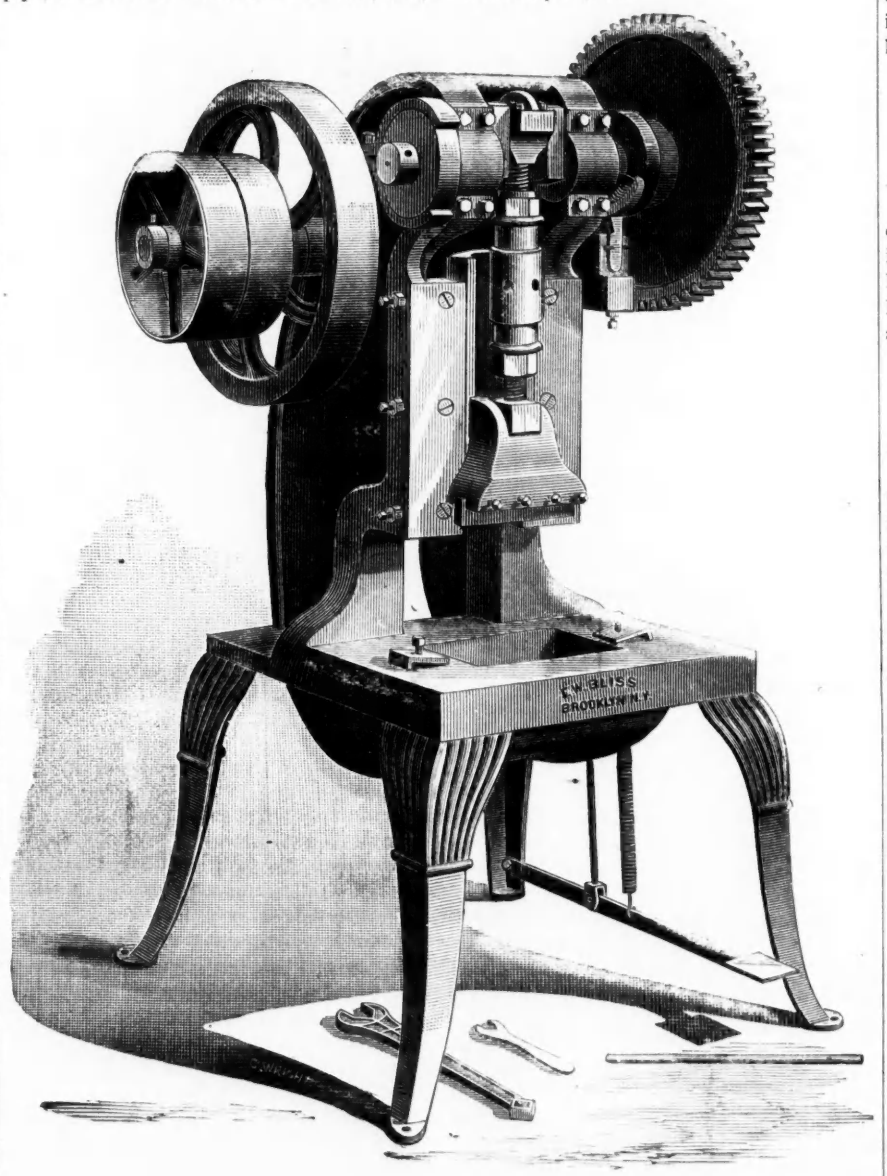
Another prominent feature is the bringing the mandrel well forward, thereby affording room for forming the class of work that occupies considerable space, such as satchel frames, etc.

As will readily be seen, the two characteristic features of this press—the long stroke and the increased distance between the mandrel and frame, while they particularly adapt it for use on special work where these features are indispensable, at the same time incidentally make it a very valuable tool—as previously explained—for those who have use for only one or two machines of this class, but have occasion to use them on a large variety of work.

In order to withstand the thrust of the mandrel, or die, at a considerable leverage, the frame is made of great strength and of careful and approved design. Ample and accurately-fitting bearing surfaces are provided, which are arranged for perfect adjustment, so as to adapt the press to the finest class of work. It is fitted with hammered steel shaft and cut-gears, of a proportion of three to one, by which a very smooth as well as strong motion is obtained.

The usual tight and loose pulleys are used, in addition to which there is a clutch of peculiar construction, which is operated by the treadle, as shown, and by means of which the mandrel is stopped and started, thereby giving the operator perfect control over its motion, without shifting the belt. The weight is 2,000 pounds.

This press is manufactured by E. W. Bliss, Plymouth, Pearl and John Streets, Brooklyn, N. Y.



IMPROVED GEARED POWER PRESS.

LETTERS FROM PRACTICAL MEN.

Getting up Steam and Starting Marine Engines.

Editor American Machinist:

Edwards, in his catechism of the Marine Engine, teaches that when getting steam the safety valve should be kept open to let the air out. When steam appears at the escape pipe, it should be lowered to its seat; and, when there is four or five pounds pressure on the steam gauge, the throttle should be opened to warm the engine up.

What is the result? The steam strikes the cold iron of the steam chest and cylinder, filling them with condensed water; and, as the joints are all slack from contraction of the iron, they leak in all directions, causing them to rust and corrode, besides five or ten minutes labor with the starting bar or reversing wheel.

Still Edwards must be right, for this is the rule with all the old engineers I meet. If you should happen in an engine room when they are getting steam, you will see some one standing with all patience (handy to the safety valve rope) watching for the steam or vapor to appear at the escape pipe.

Your contributor, Starting Bar, is more liberal. He says, "Keep the safety valve and throttle both open; and, when warming the engine up, do not let any steam into the condenser, as it will destroy the vacuum." How can a vacuum be destroyed before it is formed?

My rule is, when getting steam, to shut the safety valve, and open the throttle and all waste cocks at the time of starting the fires. If it is a beam engine, block the valves up with small pieces of wood between the toes and rock shaft. If the delivery valve over the air pump is too heavy for the air pressure to lift, have a valve placed in the channel way, called the snifting valve, and the hot air from the boiler will pass out through this valve. If it is a propeller engine, with slide valves, and they do not hang off the face, open the equilibrium valve, and the hot air from the boiler will pass through the steam chest (a portion entering the cylinder), condenser, air pump and outboard delivery, and by the time there is five pounds pressure the cylinder and steam chest will be sufficiently hot to start the engine, without five or ten minutes work running the link backwards and forwards to get clear of the dangerous crackling noise, caused by the condensed water in the cylinder. ENGINEER.

Philadelphia, Pa.

Coal per Horse Power for Steamboats.

Editor American Machinist:

Looking over Haswell's pocket book the other day, I noticed that the data respecting the old side wheel tow boat "Wm. H. Webb," gives: Indicated horse power, 1,500, and consumption of coal per hour, 1,680 lbs.; being at the rate of 1.12 lbs. per hour per I. H. P. This having struck me as rather remarkable, I found that the same authority credits the Norwich line steamer, "City of Boston," with a consumption of 2.08 lbs. coal per hour per I. H. P.

I believe that an indicated horse power per hour on a consumption of 1.8 lbs. coal is considered very good performance in a compound engine of modern design, with all advantages of surface condensation, steam jacketing, etc., and some experiments conducted by the late Theron Skeel upon the steamer "Mary Powell," gave, if my memory serves me, 3.8 lbs. coal per I. H. P. per hour as her average performance, which, in view of the improvements made in steam engineering since the days of the "Webb," would seem to be more nearly correct for engines of that day. Can any one contribute any information on this subject? and are the figures which are given for the "Webb" within the limits of possibility?

Bath, Me. CHAS. E. HYDE.

A Solution of Starting Bar's Problem.

Editor American Machinist:

In answer to the query of "Starting Bar," in your issue of December 10, I would suggest the following: If the density of the feed is $\frac{1}{32}$, and that of the blowing-off point, $\frac{2}{32}$, one part is converted into steam, and one part is blown off; hence, if the temperature of the feed is 100° and of the boiler 292°, (the sensible heat corresponding to a total heat of 1202°), then 1202° − 100° = 1102° is the heat required to raise the feed to the temperature of the *steam* in the boiler, and 292° − 100 is the heat required to raise the feed to the temperature of the *water* in the boiler. This is so much heat wasted for the water blown off, while the total amount of heat expended is 1102° + 192° = 1294°, so the percentage lost is $\frac{192}{1294}$ = .148, the answer required.

A STUDENT.

U. S. Naval Academy, Annapolis, Md.

The Ideal Centering Tool.

Editor American Machinist:

H. C. B., of Hudson, Wis., in your issue of November 5th, comes very near illustrating the "ideal" centering tool. I think, if he would use a half-round cutter in his holder, he would never want to use a square one again. IRVING W. FOX.

Rochester, Minn.

Water Line Connection.

Editor American Machinist:

In your issue of December 10th, A. H. Goff, referring to your answer to T. G., in issue of November 26, recommends the taking of steam connection for water gauge from top of boiler instead of from dome. When the boilers were placed in their position and connected up, the connections were made just as Mr. Goff recommends, and the operation of the water was just the same as at present. When the attention of the parties putting in the boilers was called to it, they suggested making connection at the dome, as they thought the water might be racing through the combination. As it is, I cannot see how Mr. Goff's arrangement will cure it. I think your answer correct.

New York. T. G.

Abuse of Lathe Shears.

Editor American Machinist:

Did you ever go into a machine shop and see a lot of short shafting, or various other work, piled up on the lathe shears? I have; and have often wondered why a machinist would use a lathe in this way, and still more so why a foreman would allow it. Very few workmen seem to realize the importance of properly taking care of tools and machinery intrusted to their care. Usually, about all you find to cover lathe shears is a single board on the tail end of the lathe, principally for the convenience of lathe tools. Take a look at these lathe shears, and notice the countless number of knocks and bruises they have received. It makes no difference if the lathe was just from the manufacturer a month ago, the result is the same. I will give a reward for a tool-post wrench that has been in use a month which is not battered up, knocking the tool around; likewise, that the handle to slide has not suffered from the same tool. The abuse of all these tools is from the force of habit. Why not form the habit of using tools for what they were designed? My plan is to cover the lathe shears up entirely, except where they are necessarily in use, never laying anything on them that will bruise; make a set of boards to fit nicely, with cleats between the shears; make them of ash, planed up, sand papered and with three coats of varnish. Don't make them all of the same width; a few boards should be narrow—say, 4", 5", 6", 8", 10" and 12". With these you can keep the shears covered nicely, regardless of the various lengths of work, and thus present a neat appearance. The board being varnished like "Sackett's

drawings," oil and dirt are easily wiped off. I would also provide each lathe with a yard of convass to lay over the shears while filing and grinding with emery, etc.

I will also give the craft a "kink" for the benefit of those who may not know. In truing up or straightening a lathe job that has been polished or finished (for instance, a saw mandrel), every lathesman knows how aggravating it is to mark on a polished surface with chalk. For a reliable and cheap marking pencil, go to the foundry and get a small piece of wet clay, "out of that kettle by the cupola;" roll it the shape of a crayon, point it about like the average blacksmith's center punch, and you have a clay pencil that will distinctly and nicely mark a polished surface. VERBUM SAT SAPIENTI.

Springfield, Ohio.

Device for Truing up Work.

Editor American Machinist:

I saw an article in the AMERICAN MACHINIST of Dec. 10, on "Truing up Work on the Face Plates of Lathes," over an unpronounceable name, but which was evidently written by a man who knew what he was writing about.

Some years ago I stole his steel rod, put a point on the other end, and made a tool for truing up work on face plates where I wanted to get a very true and nice job. The piece of Stubb's steel was $\frac{3}{16}$" in diameter and 12" long, pointed nicely on both ends, I took a piece of tool steel, $\frac{7}{16}$" by 1", flattened one end large enough to drill a hole $1\frac{1}{8}$" in diameter, and cut it off a little past the center. I then made two rings, one to fit free inside the other, each ring about $\frac{1}{8}$" thick and $\frac{3}{16}$" wide; also a round ball $\frac{5}{8}$" diameter to go inside of the rings already made. Pointed screws $\frac{1}{8}$" diameter, into each ring and ball made a universal joint. I fitted my Stubb's steel into a hole made through the center of the ball, so that it would slide pretty snugly.

Now, if you will slide the steel rod through the ball about one inch, place this tool in the tool post of the lathe, and the point on the sharp end in the center of your job on the face plate, if the work is not trued to less than $\frac{1}{1000}$" the other end of your steel point will wabble around like a rat's tail in a quart cup.

I send you a sketch of this tool. It isn't patented, for the simple reason that I havn't decided which end of the point to claim.

Auburn, N. Y. H. T. PORTER.

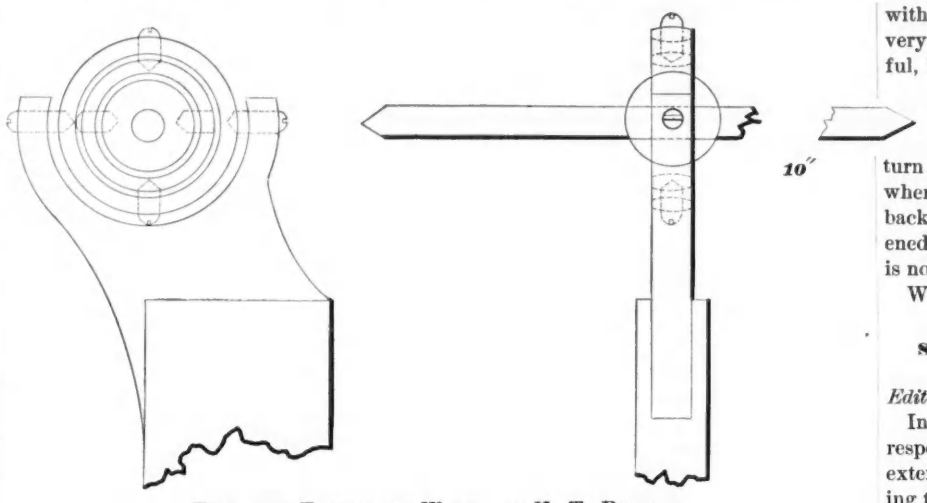
A Tool for Truing up Work.

Editor American Machinist:

In your issue No. 50, current volume, I notice an article on "Truing up work on face plates in lathes," upon which I should like to say something. With the suggestion of the writer in regard to fine lines, also pointed center punch, planing the surfaces when practicable, etc., etc., I fully agree, and have no amendment to offer; but what I have to say is concerning the use of the small steel rod. I have made and used in the lathe an implement, which I send you a sketch of, for the purpose of truing work upon the face plate, and, although it takes more time to construct than the simple steel rod used by the writer with the unpronounceable name, yet I submit that it is better in all respects, for by its use work may be chucked to run *perfectly* true, and that speedily; and when once properly made it will last a life-time.

In the engraving, *A* is a piece of tool steel, of any convenient size, say, 1" x $\frac{1}{2}$", and about 6" long. Let into one end is a cap *B*, secured to *A* by two screws *C* and *D*, so that the surface of *B* is flush with the body of *A*. A side view is shown at *G*, upon which is shown a half sphere *I*, cupped in each of the pieces. A ball *E*, is turned to fit loosely and to move freely in all directions therein. Through this ball a hole is drilled to admit the rod *F*, which should fit snugly but not tight, and should also have plenty of room in the hole through the side of the body *A*, and the cap *B*.

The rod *F* is $\frac{1}{8}$" Stubb's wire, and of any length desired. It will be evident to the workman using it that the longer the rod used the more sensitive it will be to untruth in the work upon the face plate. The wire I used was about 15" long, pointed at one end in imitation of a lathe center, and the other drawn out to a scriber point.

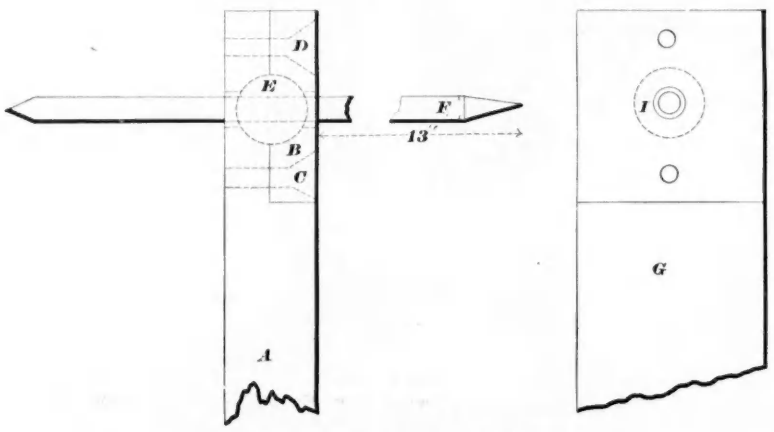


TOOL FOR TRUING UP WORK, BY H. T. PORTER.

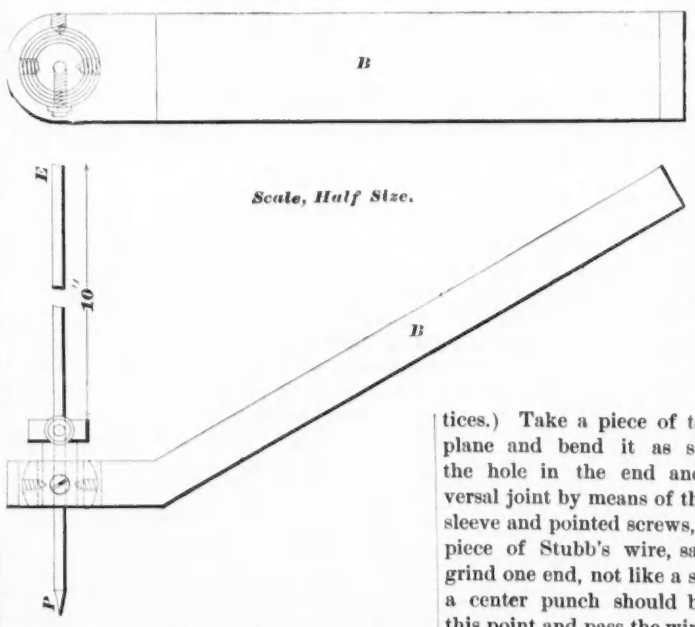
Now, to use this device, chuck the work; place *A* in the tool post and fasten it; bring the tool post close up to the work, say, $1\frac{1}{2}$" to 2", if possible; push the rod through the ball and place the pointed end in the punch mark, and proceed to true up. When the work revolves, and the scriber end *F* is seemingly at rest, the work is running absolutely true. By using in this way the wire is a lever, the ball is the fulcrum; and the shorter the short arm the more sensitive the long arm to untruth; also note that it makes no difference whatever whether the wire be straight or crooked, the effect produced being the same in either case. Any machinist who will take the trouble to construct this little "tell-tale," will be well repaid for the time spent in the satisfaction received from its use.

R. B. B.

Philadelphia, Pa.



TOOL FOR TRUING UP WORK, BY "R. B. B."



TOOL FOR TRUING UP WORK, BY "SHORT CUT."

Truing up Work and Turning Tapers.

Editor American Machinist:

The plan proposed by your Springfield correspondent, for truing up work on the face plate of a lathe, "may do for some shops and for some work," but here in Waterbury we do it differently. If the work to be chucked is without any projecting parts, "*Verbum Sat Sapienti*" may, in addition to the piece of Stubb's wire he describes, take another piece of same length and bend one end in the form of a hook, which can be hooked under the piece in the center punch mark, and as close to the work as may be convenient. Now, allowing this wire to rest on a tool held in the tool post, and as close to the first wire as possible, any error which is in the work will be greatly multiplied at the end of the bent wire, and by truing the work until the end of this wire "stands still" a much better job will be the result.

But this device is not to be compared to that of which I enclose a sketch. It is old and well known in this section, and every machinist should have one in his chest. (I have seen several good ones that were made by apprentices.) Take a piece of tool steel, $\frac{1}{2}$" x $1\frac{1}{8}$", plane and bend it as shown, then drill the hole in the end and make the universal joint by means of the ring and hollow sleeve and pointed screws, as shown; take a piece of Stubb's wire, say, $\frac{1}{8}$" diam. and grind one end, not like a scratch awl, but as a center punch should be ground; harden this point and pass the wire through the hole in the sleeve; one end of this sleeve is enlarged, and this portion is drilled and tapped to receive a thumb screw for clamping the wire at any point.

Place the bar *B* in the tool post, and the point *P* in the fine center punch mark, which is set approximately, and bring the lathe center up close to the end *E;* any little want of truth at *P* is multiplied at *E*, and by observing the motion of *E* in comparison with the lathe center, which is stationary, a very fine adjustment may be made by a careful, light-fingered operator. Before closing, let me condemn the pernicious habit of some machinists in moving both of the side screws in the tail stock when they turn a tapered piece. By moving only one; when the job is done the stock can be pushed back against the other and the screw tightened again, and the adjustment of the lathe is not lost. SHORT CUT.

Waterbury, Conn.

Southern Mechanical Exhibits at Atlanta.

Editor American Machinist:

In your issue of December 10th, your correspondent C. J. H. Woodbury, to a certain extent, does the South an injustice, by stating that a cultivator from Alabama was the only thing he saw that represented Southern industry. Now, I wish to correct this statement by saying, that if your correspondent had so desired he could have found other articles to represent the manufacturing interest of the South. In one of the wings of the Main Building he could have found cotton presses, by Cardwell & Co., of Richmond, Va., and Liddel & Co., of Charlotte, N. C. The latter firm have also a steam engine in operation in the same building. In the Annex or Agricultural Hall he could have easily found an agricultural steam engine, manufactured by Tozer & Dial, Columbia, S. C., and how he could have overlooked all the cotton gins on exhibition and found none of Southern make is more than I can tell. I do not wish to claim any especial merit for what the South has on exibition at the Fair, but I do know that it will compare very favorably with the best now on exhibition at Atlanta, and if your correspondent will take another walk through with a little less prejudice to the South, he will be able to do us more justice than he did on Nov. 17th, the date of his letter. RICHARD TOZER.

Tozer & Dial's City Machine Works, Columbia, S. C.

Cutting Screws of Coarse Pitch.

Editor American Machinist:

A plan I saw used in a Western shop for cutting threads of coarse pitch was as follows:

A shaft was rigged up along the side of the headstock, with suitable bearings attached to same. There was a pinion on the end of the shaft meshing into the large gear on the lathe spindle. The other end of the shaft, and end of the lathe screw were fitted with gears suitable to cut (in this case) threads of 6" pitch.

The support for intermediate gears was substantially the same as that described by L. F. Lyne, in Shop Kinks No. 23.

Newark, N. J. A. TRAMP.

Fast Melting.

Editor American Machinist:

In looking through the AMERICAN MACHINIST the other day, I noticed an article, entitled "How to Melt Iron Rapidly," by Thos. D. West, in which he criticises my article of June 18, entitled "Fast Melting." In his article he says: "I was sorry to see that there were no practical notes or hints on the true cause of fast melting." I do not know what more notes or hints a practical founder or melter would want than a full description of the cupola, tuyeres, blast, fuel, and mode of charging. I should think that a practical man having all these facts, could see at a glance the true cause of fast melting. He says: "I should object to having a door so high (13½ feet) for a cupola that had to melt iron of different grades during the same heat, such as iron for a cylinder, pulleys, or a roll, as the upper charges, if a poorer grade of iron, would melt before reaching the melting point." I always supposed the melting point in a cupola was the point at which the iron melted, let it be high or low, and I do not understand how iron of different grades could be melted before it reached the melting point. Mr. West then goes on to give directions for fast melting, in which he says: "Instead of laying the iron so as to cover over all the fuel, lay in the

iron so as to leave a hole in the middle. Then when you put on your other charges of fuel, each charge will connect with the lower charge all the way up, in the form of a cylinder or burning body of fuel, from the bottom to the top." This is something that is not practical at all, for the melter cannot throw a charge of a ton or two of pig iron, sprues, and scrap, into a small cupola, and have it stand up like a wall around the sides of the cupola, so he could throw a column of coal in the center; nor could he form a column of coal in the center by throwing the coal in with the iron, for it would all mix together, and the only way to form this column of coal in the center would be to go down into the cupola and lay every piece of iron and coal in its proper place. This would be a nice job for the melter when the fire was burning below and the cupola was full of heat and gas. Even if this column of coal could be formed, as Mr. West directs, it would not work, for it would take double the quantity of coal and would only amount to the same thing as the old style of melting, which was to put in a shovel of coal and a hundred of iron, a style of melting that was abandoned long ago as too slow and costly.

The height of the cupola has nothing to do with the mixing of different charges of iron when melting in a cupola, and they will not mix in either a nine or fifteen foot cupola if the charges of iron are put in with a good charge of coal between them (as they should be), and the iron tapped as fast as melted.

In the heat which I gave an account of in my article, the first charge was two tons of hard iron for a cylinder, and the balance of the heat was soft iron, and there was no trouble with the mixing of different grades.

In my work, "The Founding of Metals," published in 1877, I gave a table for the height of cupolas, in which the height varies according to the diameter of the cupola, and I went into details on the melting of iron for foundry purposes, giving full directions for charging and working cupolas. In a short time I shall commence the publication of a series of articles on the causes of slow melting, in which I shall endeavor to give the founders a few hints on melting, from practical observation.

I will now give you an account of a heat melted in a large stove foundry in a 54 inch cupola, with two tuyeres 5 by 14 inches, 5½ inches from sand bottom, and old-fashioned cylinder blowers. This heat, as will be observed, was melted with both coal and coke. The coke in the bed, 1,600 lbs., was put in first, and the coal in the bed, 900 lbs., was put in on top of the coke.

The first charge of iron, 6,000 lbs., was then put in and the next charge of coke, 250 lbs., was thrown around the sides of the cupola and the coal, 200 lbs., was thrown in the center. This mode of charging was continued through the heat, and each charge of fuel and iron was made as level as possible before the next charge was put in.

Coal.	Coke.	Gartsherrie	Allentown, No. 2.	Lucy, No. 2.	Mary, No. 1.	Fanny, No. 1.	Allentown, No. 1.	Onondaga, No. 1.	Scrap and Sprues.	Total.
900	1600	600	700	300	300	400	600	300	2800	6000
200	250	500	600	200	200	400	500	300	1800	4500
200	250	500	600	200	200	400	500	300	1800	4500
200	250	500	600	200	200	400	500	300	1800	4500
200	250	500	600	200	200	400	500	300	1800	4500
200	250	500	600	200	200	400	500	300	1800	4500
200	250	500	600	200	200	400	500	300	1800	4500
200	250	500	600	200	200	400	500	300	1800	4500
200	250	500	600	200	200	400	500	300	1800	4500
100	200	200	300	100	200	200	200	100	1800	3100
2800	4050	5300	6400	2200	2300	4200	5300	3100	20800	49600

This heat was melted in three hours and twenty minutes, from the time the blast was put on until the bottom was dropped, and the iron was very hot and even all through the heat.

EDWARD KIRK.

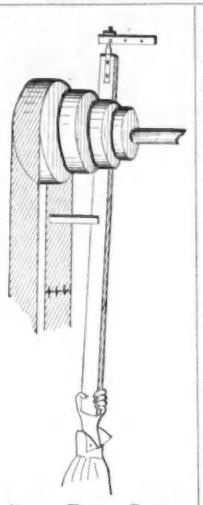
About Mandrels—A Cone Belt-Shifter.

Editor American Machinist:

While you are on the subject of mandrels, I would like to say that I find the handiest tool to drive them with is a piece of hardened steel, with a projection about as sharp as the centers. This should be undercut the same as the mandrels.

I have a very handy cone-belt shifter, which is merely a stick hanging from the ceiling, so as to turn entirely around. This is hung on the line between the largest and next smallest step of the upper cone. A rod at right angles with the stick puts the belt on or off the largest step. Any mechanic working at small job work will know how to apply and appreciate it, and the accompanying sketch will sufficiently explain it.

Chicago, Ill.



CONE BELT SHIFTER.

ORIGINAL.

The Single Cutter Reamer—Short Belts.

Editor American Machinist:

The single cutter reamer, described and illustrated by your correspondent "Ohio," in your issue of November 26th, and referred to by "Another Ohio Man" in issue of December 17th, will do good work, if properly used.

It should not be used as a boring tool, any more than any other reamer should, nor driven into the hole with a hammer, nor should it be used without oil.

It is easily kept up to standard size, and in a shop where jobbing work is sometimes done it is very handy to change cutters, or pull them out, to meet varying sizes. At a shop in Fall River, Mass., I have seen fluted reamers of their own make, with two or three spaces left blank to make a bearing surface and prevent chattering, and they worked well.

This single cutter reamer has the advantage of the principle of broad bearing surface.

I have known trouble to arise from the recess in front of the cutter not being long enough to reach below the point of the cutter.

As to belts, we all know that, on account of the greater amount of elasticity, a long belt will hold to a pulley better than a short one; but who can say exactly how short and no shorter a belt may be?

If you are crowded for room and with work, as thriving shops are apt to be, must you forego the putting in an aditional lathe because you cannot get the conventional length of belts? No. Put up your counter shaft 30″ from the line shaft, if necessary, and put a man on the lathe who will make the best of things, instead of the worst.

Any man who has run a machine shop for a few years knows that unexpected corners appear now and then, and things get turned around into queer shapes. I believe this matter has been referred to in the MACHINIST before now. I have seen two 8″ belts run together, one on top of the other, in order to get sufficient belt surface to do the work, and the plan worked well, too. I have seen a governor belt run under the pump belt for lack of room in the engine shaft; and this last idea was taken from a pair of belts in the Pacific Mills, at Lawrence, Mass. Any machinist going to work in the best shop in America will in a short time see that the shop is not perfect, and he will be able to point out defects; but that would not show that the shop did not turn out good work, nor that said machinist was wiser than his day and generation.

I may be cross-examined as to my competency as a witness in this case. Let me answer a few questions in advance.

I served a regular apprenticeship in a machine shop. I have worked in six different shops in Massachusetts—some of the best and one of the worst in the State; have worked in New York, Michigan and Ohio; have worked where there were only six men employed, and where there were six hundred men; have worked where the machinists had to turn out and help pour off in the foundry; have worked where, if a machinist was too lazy to carry a fifty-pound cross head from planer to bench, he could have a "snagger" to carry it for him.

DON QUIXOTE.

Boring Eight-foot Spiders on a Twenty-inch Lathe.

Editor American Machinist:

There is an old saying that "Any fool can work with tools, but it takes a workman to work without them." When I was an apprentice I worked in a job shop; one of those shops where they repair a steam engine one day and a clock the next—in fact, where they do every thing, and no two jobs alike. Well, a job came in one day—a lot of log spiders to bore out—a saw-mill job, no turning, just a 3-inch hole and a key way. The spiders were eight feet in diameter, and the biggest lathe would swing but three feet. I thought the boss was stuck sure; but no, he turned the head of a twenty-inch lathe so the face plate overhung the bed; backed around the milling machine till the vise stood at right angles with the lathe; made a tool and clamped in the vise, and with the subscriber as a feed, went ahead. It was a good job, but I never liked the feed. J. L. L.

Middletown, Mass.

Some Locomotive Questions Answered.

Editor American Machinist:

Answering the inquiries of your correspondent J. B. B., in your issue of Dec. 10, we would say:

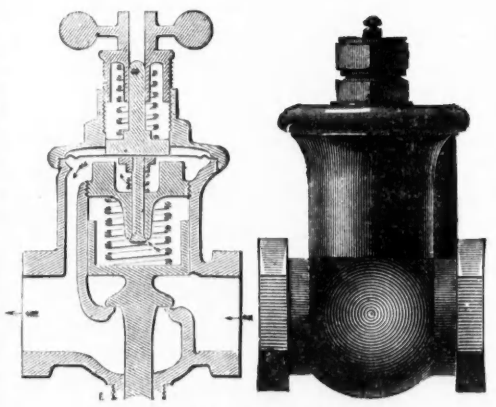
1st. We have never built a locomotive for which we claim capacity to make a speed of eighty miles per hour with an ordinary train of passenger cars.

2nd. "What has been done with the velocipede locomotive built by us last year?" This was designed for a speed of sixty miles per hour. This locomotive is described on pages 78 to 81 of our large illustrated catalogue, 2nd edition. It has run at the speed of over sixty miles per hour with five cars. See account of its performance on page 80 of the catalogue referred to.

3d. This locomotive has not yet gone to England, but we expect to ship it to that country within a few weeks.

BURNHAM, PARRY, WILLIAMS & CO.

Baldwin Locomotive Works, Philadelphia, Pa.



NEW PRESSURE REGULATOR.

Strength of Mill Floors.

Editor American Machinist:

I read Mr. Woodbury's paper on the strength of mill floors with much interest, and also Mr. Schwaab's criticism thereon. I notice Mr. Woodbury takes f to represent a factor of safety, and says $f=6$ for fixed loads; $2f=12$ for live load. I understand by this that he would use a factor of safety of 6 for storehouse floors, and one of 12 for mill floors. Using $f=12$ and $R=12960$ in Mr. Woodbury's formula No. 1, I think with Mr. Schwaab that the result would indicate a greater strength of Southern pine than is given by good authorities; and that the use of the formula would give beams smaller than are used in some very good New England cotton mills.

In another place Mr. Woodbury gives a table for dimensions of storehouse beams, where I presume from what he says above, that he uses a factor of safety of 6. In the case particularly referred to by Mr. Schwaab, of beams 6 x 12 and about 21 ft. span, with load upon floor of 50 lbs. per square ft., not including weight of floor, the beam certainly appears rather small. I think, however, that Mr. Schwaab goes too far in comparing it with mill floors of the same span, as the whole tenor of Mr. Woodbury's paper implies that he would use larger beams for a mill floor.

Kansas, Ill. JOSEPH KIRK.

New Pressure Regulator.

The accompanying illustrations represent a plain view and section of a new pressure regulating or reducing valve, intended for steam, water or gas. Its object is to maintain the pressure or escape of fluids to any extent desired.

In the section is shown a main valve, having a piston formed at the top, operating loosely within a cylinder. The object of this piston is to work the main valve for controlling the escape of fluid or liquid. The main valve and piston are formed of the same piece of metal.

The main valve is held to its seat and prevented from rising except at the proper time, by a spiral spring placed upon it, as shown in the engraving. A cap, having a small secondary valve within it, is screwed into the top of the cylinder. This valve is also held to its seat by a spiral spring. Over the top and in contact with the secondary valve, is a metallic diaphragm, which performs the double office of operating the secondary valve and making a steam tight joint to the cap which contains it, and a side passage, connecting the chamber under the diaphragm with the outlet.

A small spiral spring is placed above the diaphragm, the pressure upon it being adjusted at pleasure by the screw cap, having a wooden wheel attached.

When the spring is compressed the diaphragm gives way and opens the secondary valve upon which it rests. Let steam from a boiler be turned on, entering the passage as shown by the arrow, it raises the piston, thus opening the main valve to its full capacity. The main valve remains open until the back-pressure, rising through the side passage, increases sufficiently to raise the diaphragm, which closes the secondary valve. The steam leaking past the piston immediately equalizes the pressure, both above and below, when the spring closes the valve upon its seat, thus maintaining the pressure at which the valve has been set.

This pressure may be increased or diminished by simply putting a greater or less pressure upon the spring above the diaphragm. To always insure a sufficient quantity of steam finding its way above the piston to equalize the pressure, a small adjustable set screw is placed in the piston, so as to leave a minute opening for steam through the piston. Care should be observed to always keep this passage open, as well as to blow out the pipes to clear them of all scale and rust, before finally closing the valve. This valve is applicable to steam-heating apparatus, dryers, air pumps, water motors and all places where pressure has to be controlled automatically. The chief arguments in favor of this valve are: It occupies approximately no more space than the ordinary globe valve for the same sized pipe. Its parts are all of metal and there are no stuffing boxes to require packing, besides it is simple and may be easily understood. It is sold by A. Aller, 109 Liberty Street, N. Y., who is agent for the manufacturer.

The *Southern Lumberman*, Vol. I., No. 1., comes to us from Nashville, Tenn. It is a sixteen page paper, and appears to start off well. In his salutatory, the editor says:

"We wish it distinctly understood that we feel more at home with a line and stick than we do with a pencil, paper and press. A long and intimate connection with the lumber interest of the south, has convinced us that a reliable journal, devoted to the lumber interests of our section, is a necessity." Subscription, $2.00 a year.

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☞ *Every correspondent, in order to insure attention should give his full name and address, not for publication, but as a guarantee of good faith.*

☞ *We are not engaged in procuring patent rights, or in selling machinery; nor have we any pet scheme to advance, or hobby to ride.*

☞ *We invite correspondence from practical machinists, engineers, inventors, draughtsmen, and all those especially interested in the occupations we represent, on subjects pertaining to machinery.*

☞ *Subscribers can have the mailing address of their paper changed as often as they desire. Send both old and new addresses. Those who fail to receive their papers promptly will please notify us at once.*

NEW YORK, DECEMBER 31, 1881.

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End of Volume IV.

We present our readers this week, at the close of our year, with an alphabetical index to all the articles published in the 53 numbers of the AMERICAN MACHINIST for 1881, constituting Vol. 4.

It will be noticed that while the index is very much like the one published for Vol. 3, there are some improvements. Every distinct heading of an article is given complete in one place, without regard to repetition of the first word in several consecutive lines of type. Illustrated articles are distinguished by an asterisk, thus,*. The special index to LETTERS FROM PRACTICAL MEN, which indicates quite an expansion of this department, as compared with the same for Vol. 3, will be consulted with much satisfaction by our readers. Among the wide range of mechanical topics treated in our columns during the present year, we will here call attention to but one—that of mechanical drawing. In addition to the series of seven articles on this subject by Prof. John E. Sweet (every one of which has been reproduced entire, with the engravings, by the *English Mechanic*, one of the best mechanical journals of Europe) and the letters by Chordal on the same subject, there are from thirty to forty "letters from practical men," discussing various phases in mechanical drawing. All of these letters convey useful information to the student or apprentice.

The articles by Prof. Sweet convey something further than instructions in the art of making smooth lines and where to place them. The illustrations constitute not solely examples for practice, but point out what the author believes to be the latest and best methods of constructing the most frequently used details of mechanism.

We are therefore confident that the beginner in mechanical drawing will find no book or treatise more valuable for him to study than the AMERICAN MACHINIST for 1881.

In ending this volume, we feel constrained to express our most sincere thanks to the hundreds of our readers who have sent us letters of approbation and encouragement during the year. The phrases, "Could not get along without it," "The best mechanical paper published," "Keeps growing better every week," and others of similar import, have become more and more familiar to us as the months have flitted by. These voluntary and earnest expressions of approval are all the more appreciated by us from the fact that the writers know we are not accustomed to rush into print with their expressions of commendation.

Advantages of Free-Hand Drawing.

Boys or young men who are engaged, or who propose to engage in any way in mechanical pursuits, cannot better employ a portion of their leisure than in studying free-hand drawing, or as it would be more likely to be called in the machine shop, sketching. It is, to say the least, remarkable, that while the ability to make a reasonably correct sketch of a machine or the details of one would be of almost constant utility to the mechanic who possesses it, it is uncommon to find even in a large machine shop any one from the apprentice up to the superintendent, who can do a really creditable job at it.

In some of the industrial arts it is absolutely necessary for a draughtsman to be able to make a good free-hand drawing; but in the machine business it is not usually considered of any especial importance, and hence it is common to see a first-class mechanical draughtsman who cannot make even a presentable off-hand sketch of a common piece of a machine. Undoubtedly, this is due largely to the fact that in the details of machine construction the precise limits as to dimensions are subjects of definite measurement; but that this consideration is allowed to have undue influence we think is plain. In fact, there is good reason to believe that if a knowledge of free-hand drawing was made a part of every mechanic's education who is in any way connected with a machine shop or its belongings, the result would be greatly increased skill and efficiency, as it certainly would be of great value in the way of the advancement of any young mechanic.

It is quite generally conceded that a knowledge and the practice of mechanical drawing assists a mechanic by making him acquainted with the *theory* of forms and arrangement of parts, but it is doubtful if in this respect alone it is as valuable as a knowledge of free-hand drawing; while from the comparative ease with which the latter can be practiced, it will be much more likely to be extensively studied than the former. Moreover, a good understanding of free-hand drawing is almost certain to lead to mechanical drawing, in the mastering of which it is of great value. In fact, there is but little left to master; and in this respect, as applied to mechanics, the former may, without much stretch of the imagination, be said to include the latter.

Too many mechanics have little or no idea *why* things are so, and it would seem improbable that a young man who, along with a knowledge of how to skillfully make the various parts of a machine, acquires at the same time the skill to delineate them on paper, should fail to have instilled into his mind a good many of the principles upon which machines are constructed. It can hardly be denied that a *properly* constructed machine is a work of art, and the workman who has learned to delineate the lines that bound its several parts must almost unconsciously have instilled into his mind the reason for the proportions which they assume, and, in addition to becoming a worker in iron, he becomes an artist, with the ability to create; or, in other words, the appreciation of correctness carries with it the ability to change things that are not correct, and the man who would otherwise forever make things by standards set up for him, sets up standards for others instead.

But it is not necessary to look so high as this to find the advantages to the mechanic of a knowledge of free-hand drawing. Drawing is the only universal language of mechanics; and hence there is no other unequivocal way of expressing many of the details of machinery. The practical, every-day advantage, then, to the mechanic of being able to express his ideas in this language will be, in almost every instance, to greatly enhance the value of his services; and, further than this, the advantages to the mechanical world would be the preservation of many valuable ideas that are now lost.

If, as is generally assumed, the public schools should do something in the way of assisting in the technical education of the rising generation of mechanics, there is nothing they can do more to the purpose than laying the foundation of a knowledge of free-hand drawing, the more particularly as there can be no possible objection to it as tending to benefit a single class, since, by no possible construction, can it be denied that such knowledge would be of value to all.

Our advice, then, to every young mechanic in the country is to study mechanical drawing, but, above all, to learn free-hand drawing. No one can be better provided with examples than, for instance, the apprentice in a machine shop, and the habit once acquired leads to an interest that means success; and the assertion may be made, without fear of contradiction, that no single thing learned during an apprenticeship will be of greater value, or have a greater influence on the future career of the individual.

Cotton Manufactures at the South.

A recent item of general news declares that a new company, with a million dollars capital, will be organized about the first of January to build a new cotton mill at Augusta, Ga. Over $400,000 of the stock was subscribed in New York, Boston and Philadelphia, and the balance in Augusta. This makes $3,000,000 subscribed for cotton mills in Augusta, within three years. When the fact is taken into account that all the Augusta mills have *made over fourteen per cent.* on their capital within the last year, it is not at all surprising that the stock of new mills finds a ready market. There is abundant room for many more cotton mills at the south, which can be made to pay equally well with those of Augusta, and northern capital is certain to seize upon these rich opportunities

Literary Notes.

A TREATISE ON IRON FOUNDING. Containing a series of practical essays on Green Sand, Dry Sand and Loam Core Making; Hints on Patterns; Running Metal into Moulds; Plate Moulding; Irregular Building of a Mould; Closing the Mould; Mixtures of Cast Iron for Moulding: Cupolas; Gathering Metal for Large Castings; Chilled Castings; Chaplets, and their Use; Malleable Cast Iron, etc. By Claude Wylie, Practical Iron Moulder. Illustrated with diagrams. 8vo, cloth, 164 pages. Price, $1.40. Published by E. & F. N. Spon, 446 Broome Street, New York.

In perusing the book bearing the above title, we are convinced that its author knew what he was writing about, and has succeeded in writing a practical treatise for the use of moulders in the foundry. As a specimen of its contents, we print the following extract from the general remarks on moulding:

"There is a peculiarity about moulding upon which too much stress cannot be laid, namely, that a piece of work can *only be done once*, and if it is imperfect in any essential particular it is spoiled, and cannot be used for any other purpose, so that it must be broken up for scrap, and the work commenced *de novo*. A commercial man may correct his correspondence—the designer may modify his plans during the progress of construction—the joiner or pattern maker can replace a spoiled piece of wood—the smith can alter a forging, or use up the iron for another purpose—the boiler maker can recalk the rivets, the landings of his boiler, and so on; but in moulding, the neglect of some trifling thing may damage the whole casting, and it must be condemned. We venture to point out with pardonable pride, considering the slightness of the causes of bad castings, how very few are spoiled.

"Engineers do not hold moulders in the highest esteem, but we think the reason must be their want of knowledge of the difficulties of the moulder's art, and the full importance of his work, for it must be borne in mind that by far the greatest weight of the metals used in the construction of machinery is cast-iron. We also take this opportunity of pointing out that incompetent persons, as engineers, are sometimes appointed to examine castings, with occasionally the power of condemning them. A lad beginning his apprenticeship goes to be an engineer; he spends a few months in all the different shops, except (be it noted) the foundry, and finishes off in the drawing office. What pretension such a youth can have to the knowledge to examine castings and converse about various metals and the mixing of them is not quite apparent: yet positively it is to such persons, in many cases, that the overlooking and inspection of castings is entrusted; and by this means the moulder suffers. It is sometimes laid to the charge of moulders that they hide the faults of castings. Now, although we strongly condemn this practice, under all circumstances, we still admit a slight excuse for the moulder doing so when he knows that they are to be overlooked by an incompetent person, who may make a trouble about a mark on the surface from ignorance of its real nature and cause, but which affects the casting only in appearance."

Vick's Floral Guide for 1882, has been received from James Vick, Rochester, N. Y., accompanied by this usual annual offer, as follows:

"My Flower and Vegetable Seeds are very superior, and I wish every editor on the continent to try them, and I will, therefore, make you a present of a collection of seeds to the amount of five dollars. These I will send by express or mail, and will also prepay postage or express charges."

Although we shall not avail ourselves of this generous offer, we think the Guide worthy of notice. It contains 125 pages, profusely illustrated, representing choice flowers and vegetables.

QUESTIONS & ANSWERS.

Under this head we propose to answer questions sent us, pertaining to our specialty, correctly, and according to common sense methods.

(1) W. R. B., Baltimore, Md., asks how to case-harden set screws? *A.* See answer to question No. 4, AMERICAN MACHINIST, Dec. 24.

(2) M. W., Hamburg, asks who builds machines for making water pipes from wood shavings? (We persume our correspondent means from pulp made from wood.) *A.* We don't know who makes such machinery. We shall be pleased to hear from any of our readers who know anything with reference to it.

(3) F. C., Troy, N. Y., asks: Will you please tell me how I can run one Edison lamp? *A.* You will have to run a dynamo-electric machine, whether you run one Edison lamp or more.

(4) J. B., Coxsackie, N. Y., writes: Will you please give me a plain rule for finding the weight a beam or bar of metal will sustain, when fixed at one end and the weight applied at the other? Please give me a rule without any algebra, and don't refer me to Messrs. & Co.'s book. I want to find the weight a bar of cast and wrought iron, and of steel and bronze will sustain? *A.* For cast iron: Multiply the area of the beam in inches by the depth in inches; divide the product by the length in feet, and multiply the quotient by 110. This gives the safe load which such a beam will bear. For wrought iron: Multiply the area in inches by the depth in inches; divide the product by the length in feet, and multiply the quotient by 175. The product will be the weight in pounds that the beam will safely sustain. For steel, best quality. proceed as above, using 300 in place of 175, which will give the safe load. For bronze use 125. Example: What weight may be borne in safety by a cast iron, by a wrought iron, by a steel and by a bronze bar, 2″ in width, 3″ in depth, and projecting two feet? *A.* 2″ multiplied by 3″ equals 6″, which is the area, and 6 multiplied by 3 (the depth) equals 18, and 18″ divided by 2, the length in feet, equals 9: Hence, for cast iron, 9 multiplied by 110 equals 990 pounds; for wrought iron, 9 multiplied by 175 equals 1,575 pounds; for steel, 9 multiplied by 300 equals 2,700 pounds; and for bronze, 9 multiplied by 125 equals 1,125 pounds, the weights that could be sustained with safety by a bar of the dimensions given.

(5) J. H. R., Elmira, N. Y., asks: Will you please tell me why the rocker arms on some locomotives have an offset in the direction of their motion? *A.* It is because the central line of motion of the link is not in the same plane as that of the valve stem. In other words, you will see that the top part of the rocker arm should square with the valve stem at mid-stroke, and in like manner the lower part should square with the central line of motion of the link motion. If then you conceive the link occupying a position below the horizontal plane of the driving shaft, the central line of motion will be inclined downwards, and the bottom part of the rocker must be, as you term it, correspondingly offset.

(6) R. R., Lowell, Mass., asks: Will you please inform me if there is any such thing as a counter shaft, with only one pulley, running a screw-cutting lathe, and having a reverse motion; and do you think such a device of any value? *A.* We do not exactly understand whether you refer to the reversing motion as being in the pulley of counter shaft or in the head stock of lathe. In either event, however, it is old as applied to the purpose, and probably has some value.

(7) J. A. H., Atlantic City, N. J., asks: 1. Will a boiler one foot in diameter and three feet long, without tubes, be large enough for an engine with cylinder 1½″x4″? *A.* We suppose you propose to set the boiler horizontally and fire at one end, and connect with chimney at the other end. It will be rather small if you propose to do much work with the engine. It would be better, and more economical in the use of fuel, if made twice as long, or six feet. 2. I have a new invention in the way of a valve for a steam engine, in which I do not use any steam chest. Is it of any value, or must I use a steam chest? *A.* There is no occasion for using a steam chest if your valve does not require it. Many engines are at present constructed without steam chests.

(8) J. K., Valley Falls, N. Y., sends us a sketch of a boiler and the arrangement of feed pump, tanks, etc. There are two water tanks, in one of which cold water is allowed to run (as required, we presume), while the other is supplied with hot or condense water. The two tanks are connected by a pipe, and from this pipe the feed is taken near the hot water tank. The water in tanks is kept at a height of 2½ feet, and the tanks stand one foot above pump check. He writes: The water in the hot water tank is always hot and in the cold water tank it is always cold, and asks: 1. Why does not the temperature equalize itself? *A.* There is no reason why it should do so, as there is nothing to induce a circulation. The pump taking water nearer the hot water tank gets it more readily from that tank, but as that supply is not sufficient, it will take enough from the cold water tank to make up the required amount; but there is no reason why the water should pass by the outlet to the pump from either tank to the other, especially when the pump is working. 2. The pump valves pound at times as if they would break the cases, especially when the water is quite hot. What is the cause and the remedy for this? *A.* It is generally unpleasant to pump hot water, and the hotter it is the more difficult it becomes; but since your tank is higher than the pump, you should be able to do so. Your plan of taking the water to your pump from the connecting pipe is not the best one, since the pump may take hot water in some of its strokes and then immediately make a stroke on cold water, which would be likely to assist in producing such action of the valves as you describe. It would be better to take the water for the pump from the opposite side of the hot water tank, and as high as possible, and have it at at all times not less than six inches under water. Make this pipe at least one size, and preferably two sizes larger, and reduce it at the pump. It would materially help matters if you were to use a light spiral spring on the check valves, and if their lift is excessive reduce it. This alone may be all that is required to steady the valves, and we advise that you try it first.

(9) P. B. C., Newark, N. J., writes: I have seen noticed in the AMERICAN MACHINIST scraped bearings for planers, lathes, etc. Will you please tell me what is meant by this, and how such work is done, and what tools are used? *A.* We can only explain in this place in a general way, by saying that if you take two pieces of metal that are well planed and rub them together, you will find the surfaces will only come in contact in spots. Scraping consists in removing with a scraper the spots which come in contact, until, by repeated trials, the bearing is as near as may be on the entire surface. The scrapers are of various forms, the more common of which is made by drawing the end of a bar of ⅜″ square steel until it is about ⅛″ thick, and of a convenient width, say 1″. This is left very hard, and ground a little rounding in the direction of its width. With the other end fitted to a handle, this is used to remove the high spots, being kept quite sharp on an oilstone. In some classes of scraped surfaces it is thought sufficient to scrape them together from the indications made by rubbing one against the other, but in the better class of work each piece is surfaced separately by the aid of an accurate surface plate, and the job is concluded by scraping the pieces together.

BUSINESS SPECIALS.

50 cts. a line for each insertion under this head.

Presses & Dies. Ferracute Mach. Co., Bridgeton, N.J.

James W. See, Consulting Engineer, Hamilton, O.

Presses and Dies. Ayar Mach. Works, Salem, N. J.

List of Machinists in U. S. and Canada. Price $10. A. C. Farley & Co., Philadelphia.

Metallic Letters and Figures, to put on foundry patterns; all sizes. H.W. Knight, Seneca Falls, N.Y.

Foot Power Machinery, for workshop use, sent on trial if desired. W. F. & John Barnes, Rockford, Ill.

Latest and best books on Steam Engineering. Send stamp for Catalogue. F. Keppy, Bridgeport, Ct.

"How to Keep Boilers Clean," and other useful information for steam users and engineers. Sent free by the publisher, Jas. F. Hotchkiss, 84 John Street, N. Y.

For Sale—1 Iron Planer, Planes 8½ ft. long, 34 in. wide, 30 in. high, to be delivered in Jan. $550.00. 1 15 in. Engine Lathe, 7½ ft. bed, Wright's make. Screw Cutting, Rod feed, with counter complete, for immediate delivery, price $250.00. Both machines, in good order, are sold to be replaced with heavier. Address, Concord Axle Co., Fisherville, N.H.

"Patent Binder" for the AMERICAN MACHINIST holds 52 weekly issues in good shape. Sent to any address by mail for one dollar. We can furnish Volume 3 of the AMERICAN MACHINIST, containing the full 52 issues of 1880, neatly bound in cloth, ready to ship by express, for four dollars. Unbound, three dollars. AMERICAN MACHINIST PUBLISHING CO., 96 Fulton Street, New York.

"Useful Information for Steam Users." A 100 page *Illustrated Pamphlet.* Contains interesting data on the care and management of the steam engine and boiler, and rules for engineers and firemen. The engineers of every well regulated establishment should have this work. Sent by mail on receipt of twenty-five cents in postage stamps. The J. N. Mills Publishing Co., 165 Broadway, New York.

"Extracts from Chordal's Letters," the most interesting mechanical book published. Just the thing for a Holiday gift. A great variety of mechanical and business topics treated in a wise and witty way that will be instructive to old and young mechanics, and interesting to everybody. As many as 150 copies have been sold in a single shop. Over 40 Humorous illustrations; 320 pages, 12 mo. Price, $1.50 per copy, by mail, to any address. AMERICAN MACHINIST PUBLISHING CO., 96 Fulton St., New York.

Persons interested in the various methods of lighting by Gas or Electricity, furnishing Steam for Heat and Power, and Gas for Fuel, and who have reasons for wanting the actual facts in regard to the different systems are invited to read the *Sanitary Engineer*, a weekly journal that employs the ablest experts to treat these subjects, and aims to tell the exact truth. Commenting on its recent change to weekly issue, the *Cincinnati Gazette* says: "The success of this publication has been marked in many ways. Not only has it become a source of profit to its projector, but it has been of incalculable value to the general public, whose interest it has always served. It has affected legislation, both State and National, and bids fair to continue the recognized American authority on all departments of sanitary engineering." Published every Thursday, at 140 William St., New York, at $3.00 per year, post paid. Single copies 10cents, which should be ordered of newsdealers.

MANUFACTURES.

The Globe Iron Company, Cleveland, Ohio, are running day and night with 175 men.

The Lima, Ohio, Car Works have recently put in a 300-horse power Buckeye engine.

A. J. Whitcomb & Co. are to manufacture a new lawn mower at Chicopee, Mass.

The Maine Central Railroad Company are to build shops at Portland, Me.

New water works are being built at Hamilton, Ohio, the machinery to be furnished by local builders.

The Pittsburg Car Wheel Manufacturing Company, Pittsburg, Pa., have built a large addition to their works.

The Union Foundry and Machine Company, Rockford, Ill., have increased their capital stock $25,000.

The Bellaire Sheet Iron Company, Bellaire, Ohio, recently organized with a capital of $200,000, will soon commence the building of a rolling mill.

The Suffolk Machine Company, Boston, Mass., have recently shipped two large engines to Atlanta, Ga.

The Lafflin Manufacturing Company, of Westfield, Mass., is to be reorganized, and the foundry and machine shop will soon start up.

The Columbus & Hocking Valley Railroad Company are immediately to commence the erection of shops at Columbus, Ohio.

The St. Louis Stamping Company, St. Louis, Mo., will build an extensive addition to their present works.

The Missouri Stove Foundry Company have commenced the construction of a new foundry at St. Louis.

Cook, Rymes & Co., Charleston, Mass., have just finished a 15-ton riveting machine for the Cunningham Iron Works.

The Hawkeye Carriage Works, Burlington, Iowa are building a blacksmith shop, engine and boiler rooms, to occupy a space of 200x70 feet.

Irving W. Fox, Rochester, Minn, is meeting with a good run of sales for his boiler feed pump, which was described in the AMERICAN MACHINIST of August 6, 1881.

The Lehigh Car Manufacturing Company, Stanton, Pa., are erecting an additional machine shop. The works are running day and night, being 1,200 cars behind their orders.

George Newcomb, Salem, Mass., in addition to his business of making steam engines and general machinery, has commenced the manufacture of electric light machinery.

The Curtis Pressure Regulator, now being introduced by A. Aller, 109 Liberty Street, New York, has been adopted by the New York Steam Heating Co., and will be used in heating buildings on the Holly system.

The New York Locomotive Works, located at Rome, N. Y., have their buildings nearly completed. They will have a capacity of from 80 to 100 locomotives yearly. The buildings are of brick, and will be provided with the most approved tools and machinery.

The new car shop of the Union Pacific Railroad, at Omaha, Neb., will, when completed, be the largest building in that city, and one of the largest car shops in America. It rests upon piles, and its main floor is, strange to say, six inches below the high-water mark of last spring; but the builders hope the river will never rise so high again.

J. Stevens & Co., who at one time carried on the manufacture of machinists' small tools, at Chicopee Falls, Mass., with six men, and in a building 20x30 feet, are erecting a building for their use 75x25 feet, and four stories high, with a three-story L 25x40 feet. They employ seventy men at present, with prospects of having to increase their force.

S. B. Lowe and W. A. L. Kirk, having leased the Wilder Machine Works at Chattanooga, Tenn., will commence the manufacture of steam engines, saw-mill and grist-mill work, and general machinery. Both the parties named are gentlemen of experience in the machinery and iron line, Mr. Lowe having been a dealer in iron and supplies, and Mr. Kirk having been connected with Western manufacturing establishments.

The machine tool works of P. Blaisdell & Co., Worcester, Mass., have been enlarged. About two weeks ago a number of their employees, with their lady friends, sat down to a supper in the new addition, after which they had songs, speeches and dancing until 12 o'clock. "Some expressed a desire," says the Worcester *Spy*, "for another addition to be made to the shop soon."

Ira Parker & Co., Littleton, N. H., manufacturers of Saranac buck gloves, write us: "We are building a new factory, three floors, 50x175. Shall use 150 to 200 feet of two inch shafting, and two or three hundred feet of wire rope. Power is supplied by a turbine (120 H. P.) water wheel to run machinery in the new and old buildings.

Hendey & Meyer, Denver, Col., have a large brick machine shop, have lately completed a new pattern shop, and will soon erect a new foundry. Steam engines, hoisters and smelting furnaces are the specialties. They have built 26 engines and 16 smelting furnaces this year, besides doing a large amount of other work. They recently shipped a 35-ton smelting furnace to a Leadville mine. One of their hoisters is working in a Georgetown, Col., mine, where steam is conveyed a distance of 378 feet at an altitude of 13,000 feet above the level of the sea. It is kept constantly running, and works with surprising economy. A Denver paper says: "An engine that they have just completed was set down upon the floor the other day, in the shops, without a bolt, and ran five hundred revolutions without moving."

"The Chicago Locomotive Works" have been incorporated with a capital of $1,000,000, and it is stated have purchased several hundred acres of land in the northwest corner of Chicago, near the junction of the Milwaukee and Chicago & Pacific divisions of the Chicago, Milwaukee & St. Paul road, upon which works are to be speedily erected. There are to be twelve buildings of brick, and it is hoped to commence manufacturing by June next. The reported capacity of the establishment will be three engines per week. The company also proposes to build dwellings for its employees, and to sell them ground, thus making a profit in the land enterprise. The whole tract purchased or contracted for by the syndicate includes some 800 acres. The corporators are John T. McCauley, a merchant of this city; T. K. Tripp, general solicitor of the Chicago & Grand Trunk, and Charles Howard, of Boston, who is Vice-President of the Chicago, Texas & Mexican Central Railway Company. The other members of the syndicate are business men of Chicago and Boston. No railway company appears to be specially interested in the undertaking.—*The Railway Age.*

Newly Incorporated Companies.

ILLINOIS.

Chicago and Peoria Railroad Company; principal office, Chicago; Thos. D. Catlin, Edward C. Lewis, Henry T. Glover, Henry S. Hawley and Addison L. Griffin, corporators; Capital, $3,000,000. To construct and operate a line of railroad from some suitable point within the city of Chicago, Ill., into or near the city of Peoria, Ill.

The Oneoto Lumber Company, Chicago; F. S. Farr, Geo. F. Sinclair and Thos. G. Morris, corporators; Capital, $45,000. To manufacture and sell lumber and shingles.

Western Machinery Supply Company, East St. Louis; Henry C. Horn, Arthur H. Fulton and Alex. K. Hickey, corporators; Capital, $15,000. For the manufacture and sale of well augers, well boring, prospecting, mining, artesian and oil well tools and machinery; also rock drills and rock drilling machinery.

Vogler and Gendtner Company, Chicago; Thurman Vogler, Francis Gendtner and C. P. Portman, corporators; Capital, $200,000. For the manufacture and sale of trunks, traveling bags and leather goods.

Barnes Manufacturing Company, Freeport; Walter G. Barnes, Wm. Barnes and Rudolph Hefti, corporators; Capital, $100,000. For the manufacture and sale of agricultural implements and machinery, and other articles for domestic, mechanical and agricultural uses.

Western Electric Company, Chicago; James L. Baird, J. Wilson Howell and C. S. Holt, corporators; Capital, $1,000,000. To manufacture, buy, sell, hire, lease and dispose of electric telegraph and telephone instruments and apparatus, machinery, tools, and all kinds of implements appertaining thereto, etc.

Springfield Steam Supply and Electric Light Company, Springfield; A. L. Ide, R. D. Lawrence, S. H. Jones, and others, corporators; Capital, $50,000. To manufacture and supply heat, light, electricity and steam power.

NEW JERSEY.

Beckett and McDowell Manufacturing Company, Arlington: Wm. O. McDowell, Frederick A. McDowell and Charles C. McDowell, corporators; Capital, $150,000. To manufacture and sell machinery and tools of every kind, and to conduct a general machine business.

Rio Grande Sugar Company, Rio Grande; Charles M. Hilgert, George C. Potts, James P. Scott, and others, corporators; Capital, $250,000. To manufacture and sell sugar made from beets, sorghum, amber or other sugar cane, etc.

NEW YORK.

The Champlain Fiber Company, Willsboro, Essex County; Chas. B. Waite, H. A. Gildersleeve, E. W Richardson, and others, corporators; Capital, $80,000. To manufacture and sell wood pulp and paper.

The Excelsior Folding Chair Company, Buffalo; T. J. Phillips, J. S. Moore, C. H. Gibbs, and others, corporators; Capital, $100,000. To manufacture and sell folding chairs.

The Syracuse Iron and Tube Company, Syracuse; J. F. Wilkinson, Harvey K. Flagler and C. E. Seager, corporators; Capital, $250,000. To manufacture, sell and deal in lap-welded iron and steel boiler tubes, flues, etc.

The Western Improvement Company, New York; Dan'l B. de Monzilly, O. W. Joslyn, Thos. W. B. Hughes, Thos. C. Clarke and Herman Clarke, corporators; Capital, $500,000. To purchase and develop mines; to construct and equip railroads, steamboats and other vessels; to build and equip mills, furnaces, etc., and to manufacture, buy and sell all machinery and appliances necessary to the carrying on of said business.

Machinists' and Engineers' Supplies.

NEW YORK, Dec. 15, 1881.

We have scoured the market and can find nothing new. The dealers seem inclined to withold their future orders until after the holidays. Business however holds remarkably active for the season.

Iron and Metal Review.

There have been large sales of Pig Iron during the past week, and the demand continues active

We quote foundry No. 1. at $25.50 to $26; Foundry No. 2 X at $24; Gray Forge, $23. The stock of Foreign Iron in this market is very much reduced. We quote Gartsherrie at $25 to $26; Coltness, $26.50; Glengarnock, $24.50 to $25; Carnbroe, $24 to $24.50; Eglinton, $23.50. Steel and Iron Rails unchanged.

The demand for copper is fair at 19½c. to 19⅝c. for Lake Superior. Straits Tin, 24¼c. Australian 24¼c. to 24⅜c.; Billiton, 24c. to 24¼. Lead, 5¼c. Spelter, Western, 5⅞c. to 6c. Antimony 14¼c. to 14½c. for Cookson; American, 13c.

WANTED

Wanted—A millwright in a wood-working establishment that can make patterns. None but sober, steady men of experience need apply. Address S., care Chester and Harris Mfg. Co., St. Louis, Mo.

A large company wants a mechanical engineer, who understands, theoretically and practically, steam and machinery, and who can manage men, run the machine shop, foundry, etc. He will not be required to attend to the commercial business. To a competent man a liberal salary will be paid. Address, giving age, married or single, references and salary expected, Box No. 262, New York P. O.

Wanted—Two first-class Tool Makers, accustomed to Sewing Machine or Die Work. Address, The Dueber Watch Case Manufg. Co., Box 1334, Cincinnati, Ohio.

Wanted—A Machinist and Boiler Maker. To sober steady, and good workmen, will be paid good wages, and get steady employment; wanted to do repair and job work. The machinist must thoroughly understand steam engine repairing. Address, P. O. Box 338, Dallas, Dallas Co., Texas.

Wanted—A Pattern maker accustomed to work up small inventions, one that is experienced on both wood and metal preferred. Address "C," AMERICAN MACHINIST.

A machinist with best references wishes a situation as foreman or superintendent. Address Box 702, Lowell, Mass.

Wanted—Parties with capital and tools to manufacture my improved Oscillating Engine, Pat. Feb. 3d, 1880 The cheapest engine built. J. F. Kingsley, Sayre, Bradford Co., Pa.

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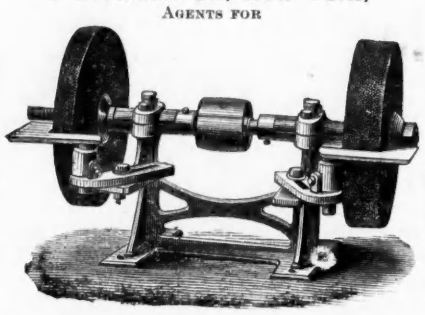

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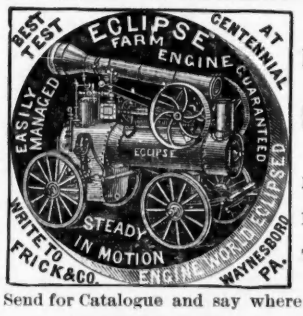

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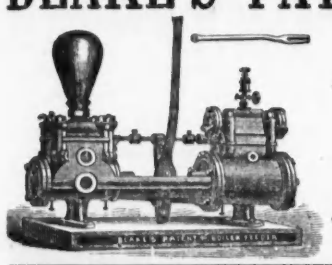

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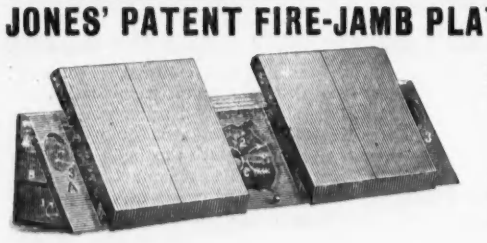

Furnish permanent and perfect protection to the boiler front and supply heated air at the bridge wall to aid in combustion of gases.

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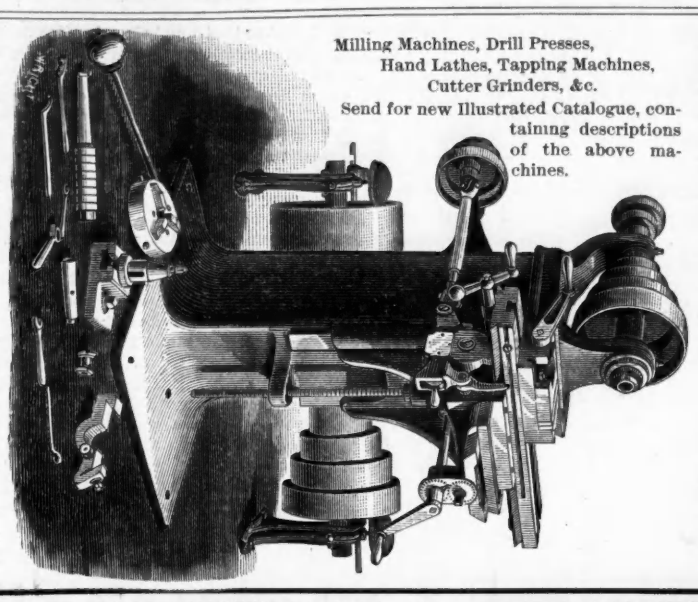

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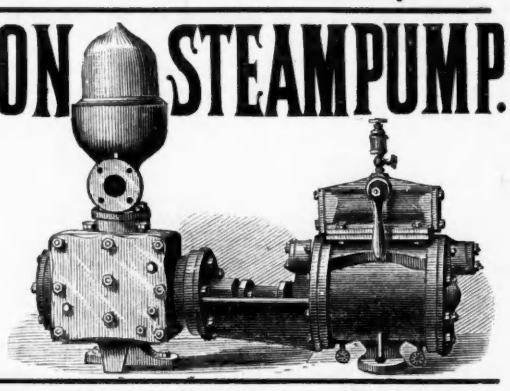

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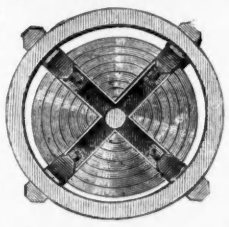

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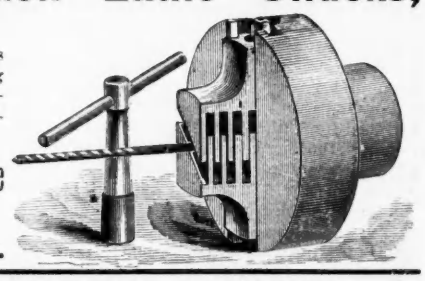

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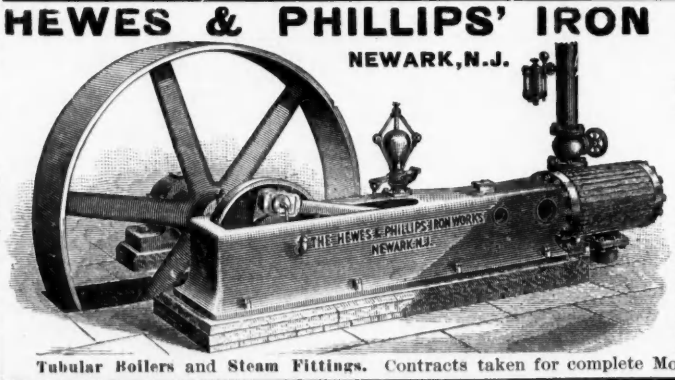

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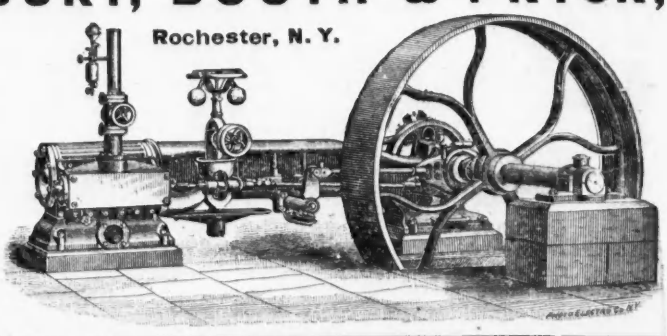

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